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# This Week in The IRON AGE

Vol. 155, No. 6 — February 8, 1945

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# Purchasing Power From Price Reduction

PERHAPS the most thought-provoking material that has crossed my desk in the last 12 months are two papers by Roland P. Soule. One of these, entitled "Technology and Employment," was delivered at the luncheon of the Division of Industrial and Engineering Chemistry at the annual meeting of the American Chemical Society in New York, on Sept. 12 of last year. The other, entitled "Technological and Industrial Trends," was given by him at a recent meeting of the Industrial Research Institute. Both of these should be read by executives who are interested in postwar planning and trends. The former has been reprinted from "Chemical and Engineering News," of the American Chemical Society, and the latter from "Textile Research," a publication of the Textile Research Institute of New York.

Space does not permit of an adequate presentation of the author's views as expressed in these two papers, but I would like to dwell for a moment on the need of cost and price reduction which he emphasizes as a requisite to expanding our boundaries of postwar purchasing power.

I will pass over the obstacles to such reductions presented both by organized labor and by government, which are well stated by Mr. Soule and present what appears to be a pertinent criticism of modern management.

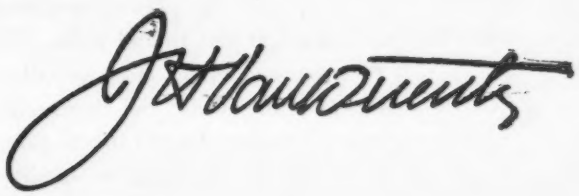
Speaking of the characteristic phenomenon of big business of today, namely the divorcement of ownership from management, Mr. Soule says: "Salaried officers tend to regard themselves as trustees for their stockholders. But the psychology of the trustee is primarily to conserve and protect and not to take risks except as a last resort. As a result, it became the instinct of too many executives to improve quality rather than to lower prices and to emphasize defensive economies rather than aggressive expansion.

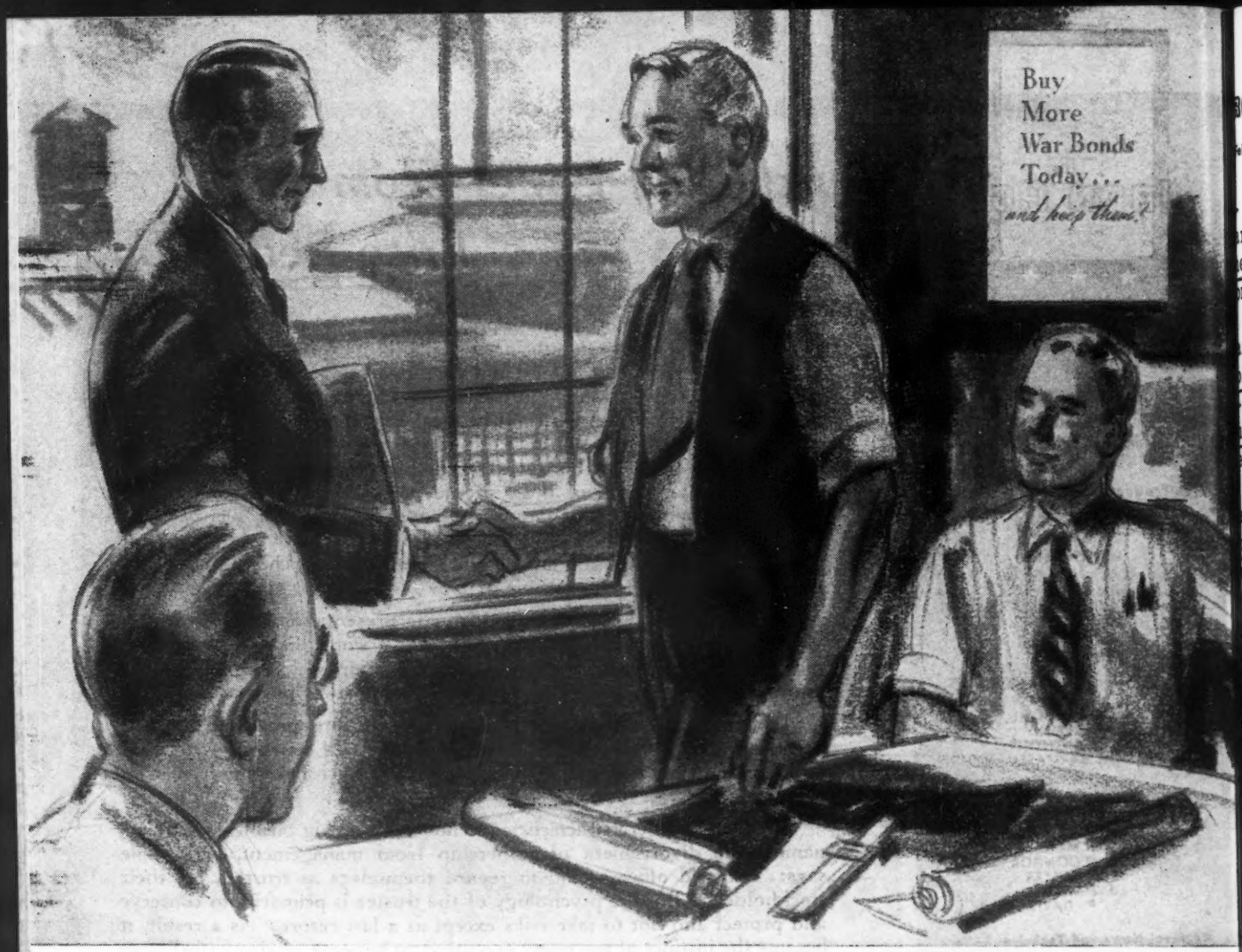
"Many a large corporation," he continues, "therefore failed to discharge its duty, not only to its stockholders, but to the country as a whole. It failed to demonstrate any economic justification for its continued existence—a responsibility which, according to a recent study made by the Brookings Institution is defaulted unless it: 'Accepts and vigorously stimulates cost reduction, volume enlarging and quality improving techniques and passes these benefits on into the consumption channel fully and promptly.'"

Prewar examples of industries which followed this policy, to the benefit of the public and ownership, and labor as well, are automotive and oil. No one familiar with business history of the past several decades can doubt the efficacy of this policy in stimulating growth of employment and enlarging markets.

Our postwar job is to cut costs and prices in all of our industries. We will certainly not gain the necessary additional employment looked for unless we do.

Of course, government must help to do this, not by subsidizing private business or public employment but by amending its policy from one of discouragement and intimidation to one of encouragement of risk taking. Excessive taxes, for example, are double acting cost and price increasers and purchasing power diminishers. They hit both the pay envelope and the cost sheet.



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The
ON AGE
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# NEWS FRONT

More than 300 Belgian plants including steel and foundry units that have escaped r damage or have been restored to production are now turning out war supplies for e United States Army and troops of other Allied nations under reciprocal aid ntracts.

Steel mills there are rolling rails, I-beams, T-beams and other material for new ilroads and for the reconstruction of bridges and tracks. One mill has already lled 7000 tons of steel rails.

War Department steel requirements will reach an all time high for the second arter with a demand in excess of 4,500,000 tons. Third and fourth quarter steel mands will probably be still higher.

While military procurement will only be about $1,000,000,000 higher this year over st year, steel demand will be much greater because the items now needed use much re steel. This increase will be reflected in boosts in the following programs: munition, landing mats, aircraft, light-heavy trucks, tanks, heavy artillery, drum ock and bombs and rockets.

It is believed that Republic's Brassert-Cape direct reduction unit at Warren, io, is now turning out a satisfactory grade of iron. However, continued production dicates a need for re-designing some of the equipment.

This re-designing is being done, and a proposal will be made to DPC this week in- lving an additional expenditure of, perhaps, $200,000.

Non-Lend-Lease exports from the U. S. in the 11 months ended November was $2,730,- 0,000, or 12 per cent above the same period in 1943. This is at least three times e value of British exports for the whole year.

And: Imports into the U. S. for the same 11 months amounted to $3,570,000,000, or out $800,000,000 more than non-Lend-Lease exports. Ignoring Lend-Lease, which is ite a feat, this represents the unusual condition of exporting more than importing.

Nearly 2000 British airmen who had to land in France during the occupation got ck to Britain with the help of the resistance movement. Some of the American airmen ming through the same way tell of rugged experiences, that of being prevented from rrendering to the Germans and of having to commit overt acts to satisfy resistance vement members.

Some tens of thousands of German deserters are hiding inside the Reich and many ousands have crossed into Switzerland and Spain. Most deserters are from the Army d Navy, with Luftwaffe deserters in the minority.

However, recent German internal broadcasts complain that German pilots who crash thin Germany are disappearing, and ask that civilians forward numbers on pieces of uipment so that pilots may be identified. The broadcast also complains that German vilians too readily strip German aircraft for souvenirs.

The ratio of British and U. S. airplanes of all types operating on the Western ont is about 50-50.

German jet-propelled fighters attain a speed of 620 miles per hr., according to a iss report. Such speed compels the pilot to lie in a prone position at the con- ols.

The German War Production Board was advised Dec. 1 that V-3 would be ready for ring against the U. S. by the end of December. It's currently overdue.

Now that the U. S. has a big supply of robot bombs about ready for use against rmany and Japan, there is now no more talk of robot bombs being wanton instruments a depraved State bent on senseless destruction.

Naturally the U. S. robot bombs will be much more accurate and efficient.

Additional details on the German V-2, or rocket bomb, indicate that the combus- ion, or jet, is derived from four fuels, namely, hydrogen peroxide, calcium perman- nate, ethyl alcohol and liquid oxygen. These fuels are stored in tanks.

The direction of the jet stream is controlled by carbon vanes over which the re- tion gases pass. Mild steel is used throughout the rocket and no effort is made to ep the weight down. The outer shell is duraluminum. Provision is made for de-icing the stratosphere. When the rocket hits the lower altitudes at a speed close to 00 miles per hr. the friction is so great that whole rocket becomes hot.

It has been observed glowing red during the latter part of the descent.

# Isothermal Treatment Of Pistol Parts

***. . . "Austempering preferred," appears on many Ordnance drawings today. Those parts that cannot be made tougher or with greater impact strength by adding strengthening radii or by radical design changes, can be austempered in the liquid bath to meet severe service conditions.***

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By ROY M. ELLIS

*Chief Engineer, Remington Rand, Inc., "C" Division, Syracuse, N. Y.*

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MASS production has one weakness — inflexibility. Design changes at one point can dislocate hundreds of processes all down the line. Arbitrary or abrupt design changes can, in fact, produce something of a crisis. Consider, for example, the indirect effect of copper and zinc shortages upon the design of the government model caliber 0.45 automatic pistol.

Development of steel cartridge cases by the Ordnance Department and ammunition makers required obvious minor modifications in barrel chambers and extraction mechanisms of small arms. Such changes were readily made, but a more formidable difficulty was disclosed when it was found that the extractors of existing design were no longer meeting endurance tests on the firing ranges.

Here was a problem. Design changes for increased strength offered no solution, because any new or modified extractor must continue to interchange in every detail with existing pistols in all branches of the service. It is not generally realized that modern small arms produced under the supervision of the Army Ordnance Department are far superior in endurance and interchangeability to those made during the first world war. This does reflect the trend toward interchangeability already far advanced in peacetime production methods. But its flawless perfection today is due primarily to the close contact between the Industrial Branch of the Small Arms Section and the skillful planning and cooperation of the engineers of the Pistol Industry Integration Committee. Nevertheless, it was this very factor of perfect interchangeability which made the problem a critical one.

A clearer visual understanding of the function of an extractor may be had from Fig. 1. What is not so apparent is the fact that the extractor, which is of W.D. 1075 steel, with a required Rockwell D 58-63, besides having thick and thin sections abruptly blended, is also fitted to a form gage in the final phase of manufacture. That is, it must be bent just enough to impart the positive spring action which helps to press the hook down onto the cartridge case extraction ring. Steel cases, by expanding and taking a slight set in the barrel chamber, imposed an extra burden on the extractor and caused excessive breakage at the point indicated, close to the hook end.

The actual structure of the steel at that point of breakage is shown in the photomicrograph, Fig. 2. This is after standard heat treatment specified up to that time. It would appear to have been suitable for the service encountered generally, and it was produced by holding the extractor at a temperature of 1500 deg. F. for 5 min., then quenching in oil and tempering for 1 hr. The suggestion that isothermal treatment in liquid baths might improve the service life of this part was made in metallurgical conferences by Walter Bolton, consulting metallurgist of the Wycoff Drawn Steel Co. Opinions were by no means unanimous, however, in view of the thick and thin sections, sharp corners, and the pronounced warping which seemed unavoidable under the old method, for which atmosphere furnaces had been utilized throughout.

*For another article on Austempering, see* THE IRON AGE, *Aug.* 31, 1939, *p.* 21.

Since there were many theoretical differences of opinion, it was agreed to experiment for confirmation by practical tests, and 100 extractors were austempered, first heating by immersion in a liquid bath at 1500 deg. F., followed by transfer to another liquid bath held at a fixed temperature of 600 deg. F. The structure secured is shown in Fig. 3 (Nital etch, 1000 diameters).

These photomicrographs are worthy of study by those who specialize in minute differences as an index of physical properties. Comparison with the previous structure is interesting in itself, but the actual changes in physical properties disclosed upon

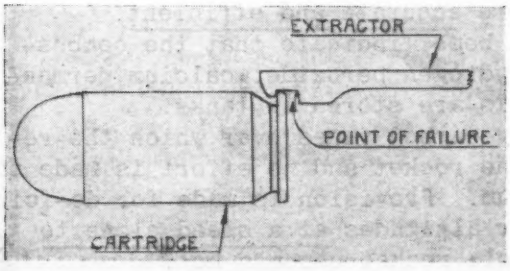


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FIG. 1 — The mechanical function and previous point of failure in extractors are shown here. The cartridge is assumed to be in the firing chamber.

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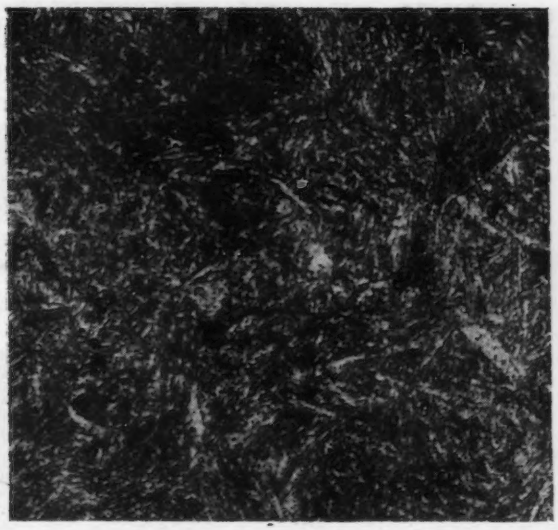

FIG. 2—Structure secured by old quench-and-temper methods at the point of fracture is conventional for W. D. 1075 steel used in the extractor part. At 1000 diameters, Nital etch.

FIG. 3—Structure of W. D. 1075 steel developed at former point of fracture by isothermal methods. Scarcely a clue as to the enormously superior toughness of the part is given by the metallography of this section near the hook end of the extractor.

mechanical and service testing were not short of phenomenal.

Not only were all the extractors accurately to gage after the process in liquid baths, with required hardness at all testing points, but when held in a vise close to the extraction hook, these extractors could be bent by hammer blows inward or outward from the cartridge at a 90 deg. angle without fracture. Extractors having the structure shown in Fig. 2 fractured very readily. Twisting the entire length up to four terms did not cause fracture at any point in the isothermally treated samples. (See Fig. 4.) Inasmuch as these rough mechanical tests showed decided progress in the direction of physical properties desired, the next test was made in endurance guns, which were fired directly under the supervision of the residence inspector. The result is of significance in the evolution of this and similar components, as will be seen.

An extractor, selected quite at random, was given a prolonged endurance test, which was continued up to 32,900 extractions. When removed from the gun, it was found that the hook extraction lip was altogether free of distortion, and no set or loss in spring tension had taken place. The extractor likewise fitted the forming gages perfectly, as if no severe service had taken place. This performance was so extraordinary as to seem incredible to designers and engineers directly concerned.

In order to eliminate the possibility that this extractor was not typical, a supply of extractors austempered in the liquid bath was sent to all pistol facilities for endurance tests and report. These and others tested showed extractions of 15,000 and 20,000, with no deformation whatever at the extraction hook, and no loss of spring tension. Moreover, all of them fitted the original bending gage as if they had just come from production. With these performances established, all doubts were removed, and the tests were accepted as conclusive.

It is now mandatory to austemper extractors as described. Since this isothermal method in liquid baths has been in use, reports from all over the country reveal that only two extractors have broken in the regular Ordnance endurance tests. One was caused by a seam in stock; the cause of the other failure could not be determined. During this period many hundreds of thousands of extractions have been made under strict inspection.

It is of further interest to observe that isothermal treatment has turned out to be the means of salvaging many thousands of extractors which had been made before the necessity of structural changes developed. Tests

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FIG. 4—A clear view of the extractor part, with its thick and thin sections, points of failure under quench and temper, and superior physical properties after treating isothermally.

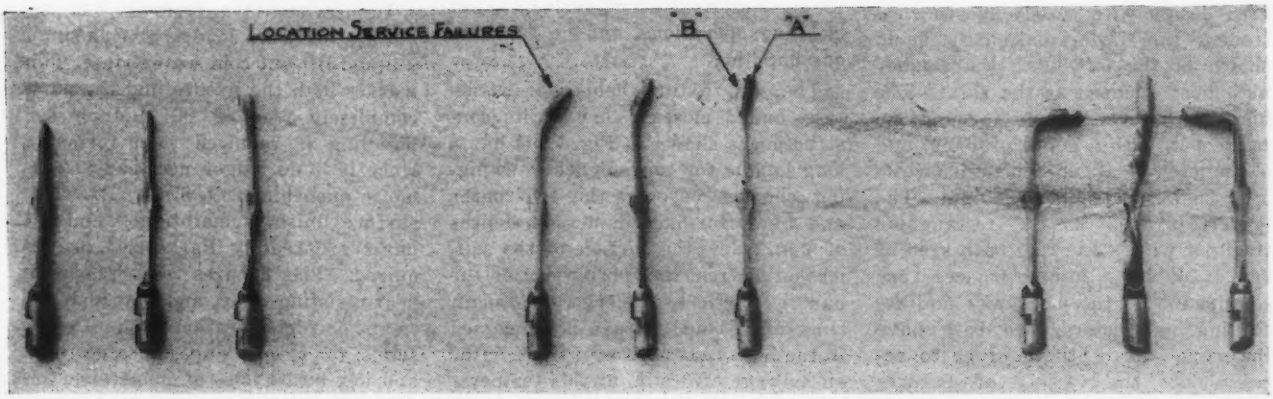

FIG. 5—General view of the heat treating department at Remington Rand "C" Division, Syracuse. A variety of equipment is shown, permitting all types of heat treatment for production or comparative methods to be utilized.

conducted with such salvaged parts, after careful annealing and austempering as described, showed no burring at the extractor lip. These parts likewise fitted the form gages after endurance firing up to 15,000 rounds. In one prolonged endurance test to find the ultimate breakdown point, the test extractor held up for nearly 30,000 extractions. No failure was observed, but it was considered unnecessary to continue the test. In other words, the breakdown limits for that part have not yet been determined.

### Procedure in Liquid Baths

The isothermal procedure was first set up at the plant of the Remington Rand "C" Division, in Syracuse, N. Y. A view of the heat treating department is shown in Fig. 5. It is equipped for all types of heat treatment which might be required of any component in the caliber 0.45 pistol, either for immediate comparisons and metallographic tests, or for standard production on a large scale. The two immersed electrode salt bath furnaces shown in Fig. 6 are of the Ajax-Hultgren design with closely spaced electrodes, the isothermal bath being shown at the left, with the smaller high heat furnace at the right. The high heat furnace has a round ceramic pot, with a depth of 16 in. and a diameter of 12 in. This furnace is of a 25 kw. rated power input. The larger furnace has a rectangular steel pot with a working bath area of 36x20x16 in. Both furnaces are equipped with thermocouples and recording pyrometers, and both have the same salt depth in order to accommodate the variety of fixtures and parts for which isothermal treatment has been adopted.

A fixed 600 deg. F. temperature is maintained without difficulty and the mass of average charges introduced at 1500 deg. F. from the high heat furnace is never large enough to cause temperature rise.

Extractors, being of a peculiar whiplike shape, as clearly seen in Fig. 4, are held by the butt end in a special fixture devised by engineers of the Ajax Electric Co., Philadelphia, who also designed and manufactured the two furnaces. The entire cycle takes less than 45 min., including unloading and loading time, as well as the cold water rinse. This compares with up to 2 hr. as required under the old method of quench and temper, the main time saving being omission of the 1 hr. tempering period, fewer cleaning operations, and no superfluous handling.

The web fixture holds 84 extractors, and a closeup view of its construction is shown in Fig. 7. It has a long handle for convenience in swinging charges between the two baths and a stop for fixed immersion depths of 4 in. below the surface of the salt, measured from the top portion of the part which is to undergo treatment. Only one loaded fixture is immersed in the high heat bath at a time. After an average of 3 min. at this temperature, the charge is swung to the isothermal bath furnace. This holds five loaded fixtures, so that one full charge comes off every 3 min. when the production cycle has begun on the first shift. An average of 15 min. in the 600 deg. F. fixed temperature bath is required for full austempering, with some degree of latitude either way to allow for the human factor when only one operator is in charge of this process, as frequently occurs.

Electric salt baths of this type are simple and economical to operate, and since there are no explosion hazards or excessive radiated heat, operators prefer the austempering assignment to any other in the department. Temperature control, so important in this and similar processes, is so simple that all that is required is the setting of a dial. Temperature variations are all below the 5 deg. specified by the furnace makers anywhere in the bath. Heating is perceptibly faster, and the total absence of distortion has marked up the most important gain in addition to the enhanced physicals.

Upon withdrawal from the 600 deg. bath, the fixture load is given a single dip-and-lift-out cold water rinse. This washes both the fixture and the parts completely free of salt. Much less handling is required than formerly, since it is no longer necessary to remove quenching oil films. Excellent surface finish is maintained and the parts are readily Parkerized, as required. The fixtures are of special heat-resisting alloy, and they show no wear or deterioration under thousands of severe and repeated high and low heat cycles of immersion fol-

lowed by further cooling in the cold water.

Because of the vertical suspension of parts in these fixtures, salt dragout is relatively unimportant. It amounts to approximately 150 lb. per month, including both types of salt, and it includes total dragout for a variety of parts, as averaged on high production schedules of 20 to 24 hr. per day, over a period of six months. No perceptible electrode or pot wear has been observed up to date. A standard brand of neutral salt is used for the 1500 deg. bath, and a standard tempering type of salt is used in the isothermal bath.

## Other Parts

There are other parts in the government caliber 0.45 pistol for which austempering has offered the most effective means of prolonging service life beyond all previous experience. Perhaps the most interesting, in view of the great shock and impact stresses encountered, is the component known as the barrel bushing. Its function is less complicated mechanically than that of the extractor, as may be seen from its structural shape, as shown in Fig. 8. It is of W. D. 1075 steel, heat treated to Rd 50-60. It secures the end of the gun slide and supports the barrel muzzle. Its function includes that of the locking lug, which is only 0.091 in. thick and which must withstand the powerful instantaneous backward thrust of the gunslide action when the pistol is fired, and the forward thrust from the heavy recoil spring as the slide returns to the full recoil position. The service stress for that lug has been calculated in foot-pounds and is best described as repeated peening hammer-blows concentrated on the lug itself and producing a dual flexing action at the point where this thin lug joins the body of the bushing. Fig. 8 also shows how this lug usually fractured, after approximately 5000 breakdown firing tests with zipped-up modern ammunition.

Experience with the uniformity of liquid bath heating for austempering the extractor, with its own thick and thin sections, led to a similar experimental and testing procedure with the barrel bushing. Temperatures used were increased 50 deg. in the high-temperature isothermal quench bath, other temperatures and the time cycles all remaining the same. Rod-type fixtures of the type shown in Fig. 9 were devised for suspending an average of 12 bushings at a single immersion.

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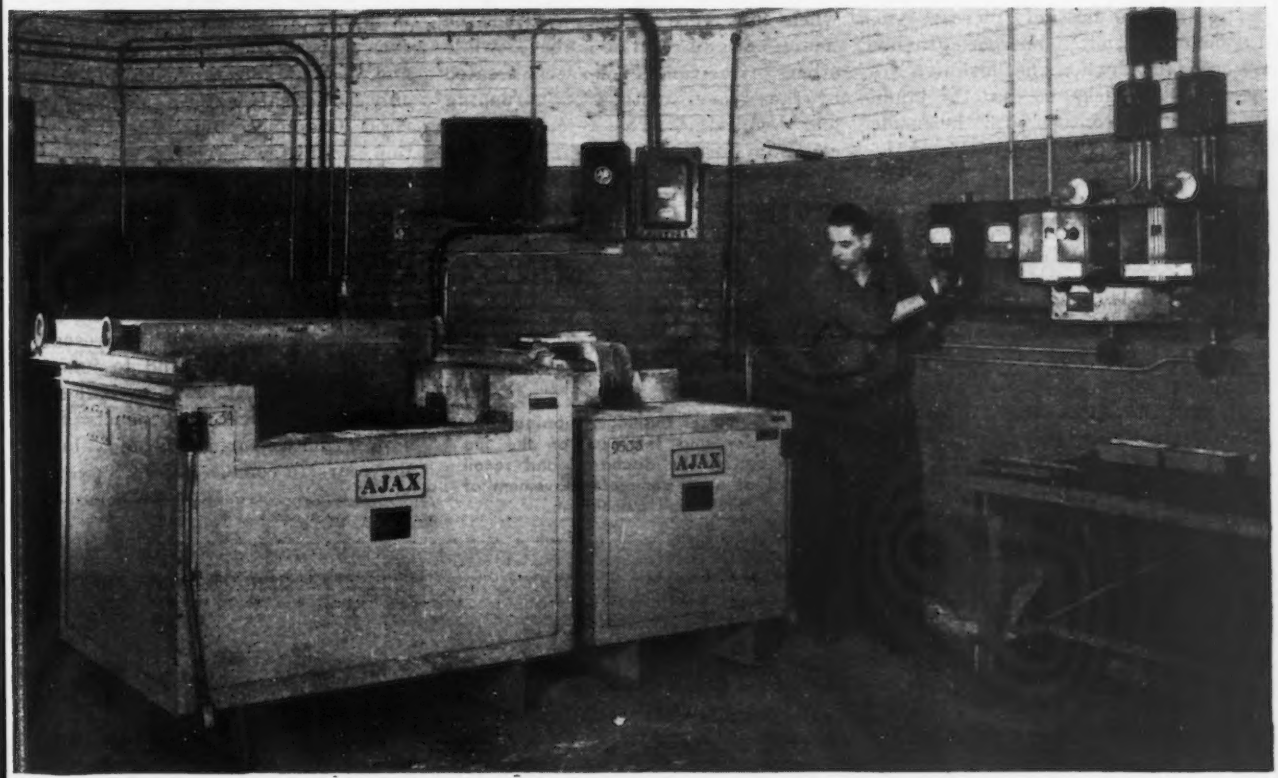
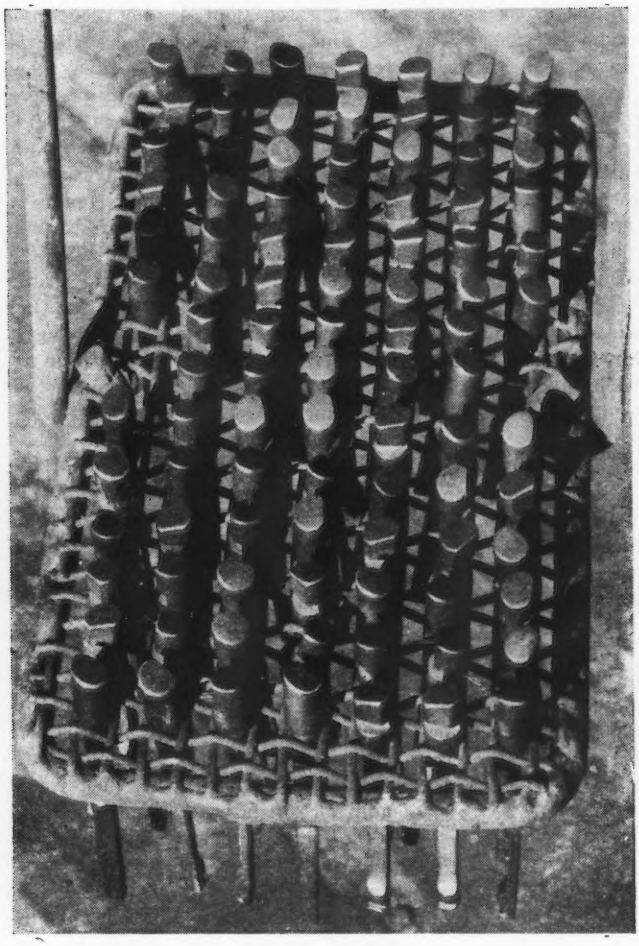
FIG. 6—Closeup view of the two salt bath furnaces used in the isothermal process. Both furnaces have the same salt depth. Controls and recording pyrometers are placed near the furnace for operating convenience.

After treatment and metallographic examination, bushings were likewise test fired and then submitted to all national facilities for endurance tests under strict Army Ordnance supervision. One of these test bushings was used in three pistols. Each was fired 15,000 rounds. After surviving a total of 45,000 rounds, this bushing showed a minute check under Magna Glow. The check was found in the bushing body itself, however, and not where failures had been occurring at the lug juncture. It was placed in another pistol and submitted to another endurance test of 10,000 rounds, without observable failure or wear.

These outstanding cases have shown that when a part cannot be made stronger by adding strengthening radii in sharp corners, or by radical design changes, it can be accomplished by austempering in the liquid bath. The practicability of the method is seen in the fact that as yet we have not had any rejects due to distortion or hardness discrepancies. One by-product effect has been the increased service life of pistols generally. During the first world war, 2000-round endurance tests were standard. Early in the manufacture of this pistol, an endurance test of 5000 rounds was adopted. Today a 10,000-round test is conducted once a month. This increased service life, which is now taken as a matter of course, would not have been possible if the functional life of extractors had not been





LEFT

FIG. 7 — Fixture loaded with extractors ready for immersion in the high heat salt bath for isothermal treatment. Long handle suspension and stop for proper depth of immersion are not shown.

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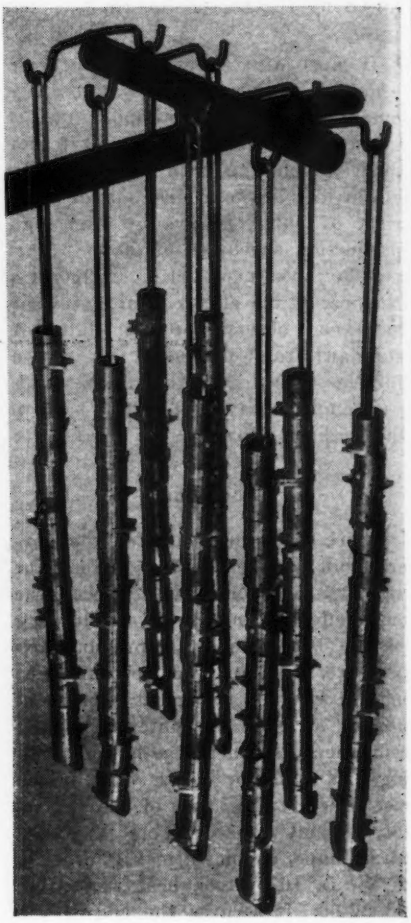

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FIG. 9—Rod suspension for the barrel bushings, as utilized in the isothermal process described in the text. Note thinness of the rods, permitting complete contact with the molten salt with inside and outside sections.

increased to 32,900 extractions on steel shells, and that of the barrel bushing to well over 45,000 rounds.

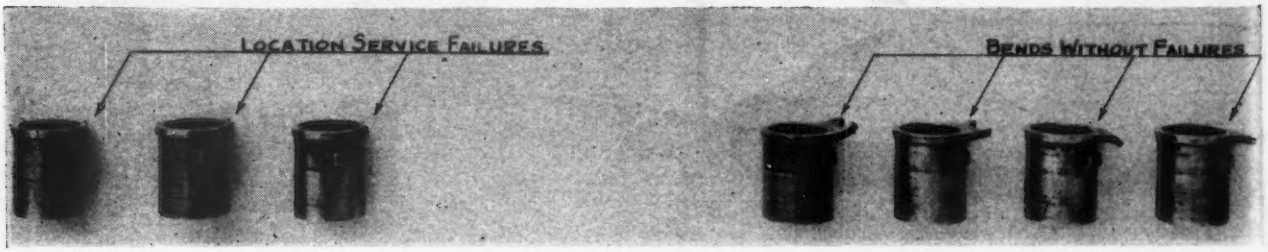
Thus it is seen that austempering in liquid baths not only increased total pistol life, but it has been further observed that when the bushings are hardened on racks, so that the liquid salt is in full contact with the inside and outside sections as well as the heavy locking lug and locking collar, all warping was eliminated. A series of two test runs of 1500 were made, using a special testing fixture before and after austempering, and only three pieces were out of round. Previously, it was a regular operation to test and correct out of round barrel bushings. This is no longer necessary.

Indeed, the improvement in distortion on these components was so noticeable that the process was tried out on four other parts, including the safety lock, ejector, disconnector, barrell link and firing-pin stop plate. Samples that were correct to gage when soft were austempered in the liquid bath as outlined above, while others of the same group were treated by the former method of hardening and tempering. The rejections disclosed by test gages on the austempered parts was so extremely small that the old method was discontinued at once, and recognition of this time and cost saving is found in all government blueprints which specify hardening procedures. The words, "Austempering preferred," appear on many pistol drawings today.

o o o

FIG. 8—Barrel bushings, showing relative size and thickness of the lug which carries the discharge and recoil impact at each complete movement of the recoil mechanism.

Thus it is seen that a method which at first was considered theoretical and even debatable by many metallurgists and designers has proved to be the only practical way of meeting the rigid Ordnance Department inspection, with fewer rejects after heat treating, on parts which could not, perhaps, have been improved to this degree, even had tolerances and interchangeability permitted. The whole project has been of importance in itself during critical phases of the war, but we see a field for further research here at Remington Rand to improve the mechanism at lower overall costs for regular peacetime products. Such a program is sure to be of value in the years to come.



# British Developments In Cam Turning

SEVERAL interesting design principles are found in the profile turning lathe for multiple throw automotive camshafts, developed by the British firm of Arthur Scrivener, Ltd., Birmingham. As indicated in Fig. 1, each individual tool (there may be 24) is mounted in a slide, the in and out motion of which is controlled by a master cam, several times the size of the product, which rotates at the same speed as the work. The roller follower is a standard straight cylindrical roller bearing.

As can be seen in Fig. 2, however, the tool shape is quite unconventional in that it has a radius in the vertical face of the nose. In order that the form traced out by the point of the tool will be the approximate shape for which the master cam is designed, the radius of the tool point and the radius of the tool follower have a definite relationship to each other. The cutting action of the tool is accomplished by traversing the tool axially along the camshaft. It is fundamental for the production of accurate work by this method that the correct radius is maintained on the tip of the tool and that the center line of this radius is always at the proper height.

Production time is determined by the material and the amount of stock to be removed. In the case of many conventional automobile engine camshafts, a single traverse of the tools produces a finish turned camshaft of sufficient accuracy to obviate all subsequent operations except heat treatment and final grinding. Usually, all of the cams may be produced at the same time, thus assuring accurate timing as well as high production. In this way a camshaft for a four or six cylinder automobile engine can be machined in a floor to floor time of 3½ min. as a maximum. Camshafts may be produced on this machine from bar stock which has been previously necked between the cams or from forgings.

A plan view of the machine is shown in Fig. 3 and a rear view in Fig. 4. The latter shows the hydro-mechanical arrangement for giving infinitely variable feeds of the tools.

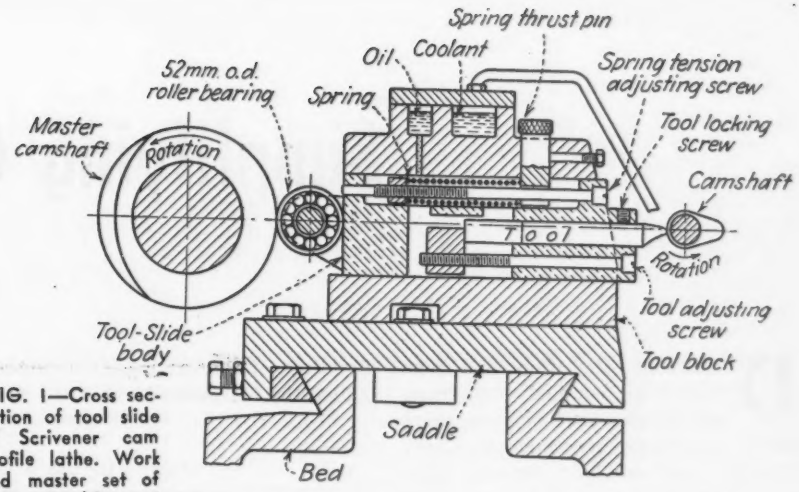



FIG. 1—Cross section of tool slide of Scrivener cam profile lathe. Work and master set of cams are driven at the same speed.

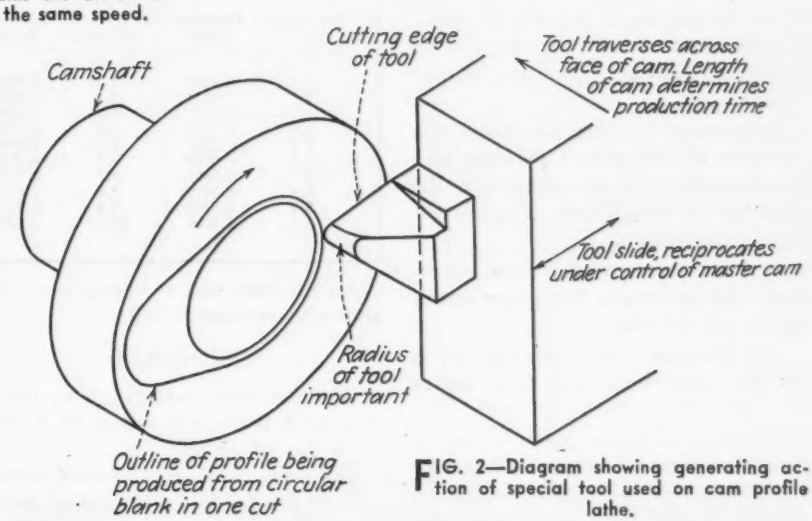

Camshaft
Cutting edge of tool
Tool traverses across face of cam. Length of cam determines production time
Tool slide, reciprocates under control of master cam
Radius of tool important
Outline of profile being produced from circular blank in one cut

FIG. 2—Diagram showing generating action of special tool used on cam profile lathe.

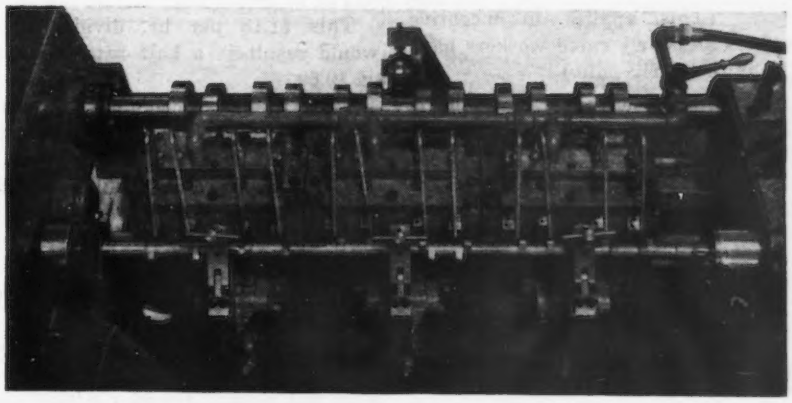


FIG. 3—Plan view of Scrivener automatic camshaft turning lathe, showing a 24-throw aircraft camshaft being machined 12 throws at a time.

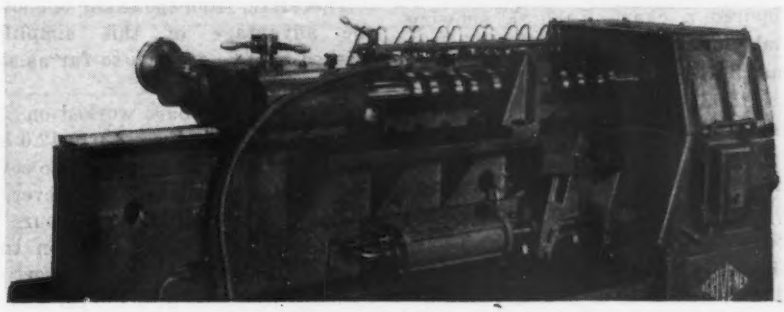


FIG. 4—Rear view of the machine, showing the master camshaft and the simple hydraulic longitudinal tool feed.

# . . . Simplifying Computation of

DUE to existing wage and hour legislation coupled with various clauses in labor contracts which guarantee overtime premiums of time and one-half for all time worked in excess of 8 hr. per day or 40 hr. per week, a problem arises in industry in so far as computation of these overtime premiums is concerned.

Apparently industry has taken this situation in stride and perhaps also for granted, with no thought in the direction of simplifying this complicated computation.

As far as is known the usual procedure with perhaps a few minor deviations is as follows:

(1) Compute total earnings on a straight time basis for total hours worked.

(2) If total hours are in excess of eight, the total earnings for the day are divided by the number of hours worked to find the average rate per hour. (This applies to incentive workers as hourly rated workers have a definite hourly rate.)

(3) This average rate per hour is then divided by two to determine the half rate per hour to be used in computing overtime premium by multiplying the half rate per hour by the number of overtime hours.

Even though the above procedure is not mathematically complicated it is, however, a method which requires a great deal of time on the part of time clerks.

In an endeavor to eliminate most of this so-called "lost time" in making these computations, the writer has prepared a chart, Table I, showing total number of hours worked and a multiplying factor which when used with total straight time earnings will furnish total over-time premium in one simple computation. (This same method can also be used on earnings of hourly rated workers with accurate results.)

Because most time clerks have calculators available to extend earnings, etc., this one multiplying operation can be completed even before the first dividing operation could be started under the old method.

**TABLE I**

Factors for Use in Calculating Overtime Premiums

| Total Hours Worked | Overtime Factor | Total Hours Worked | Overtime Factor | Total Hours Worked | Overtime Factor | Total Hours Worked | Overtime Factor |
|---|---|---|---|---|---|---|---|
| 8.1 | 0.0062 | 9.1 | 0.0605 | 10.1 | 0.1040 | 11.1 | 0.1397 |
| 8.2 | 0.0123 | 9.2 | 0.0653 | 10.2 | 0.1079 | 11.2 | 0.1429 |
| 8.3 | 0.0181 | 9.3 | 0.0699 | 10.3 | 0.1117 | 11.3 | 0.1461 |
| 8.4 | 0.0239 | 9.4 | 0.0745 | 10.4 | 0.1154 | 11.4 | 0.1492 |
| 8.5 | 0.0295 | 9.5 | 0.0790 | 10.5 | 0.1191 | 11.5 | 0.1522 |
| 8.6 | 0.0349 | 9.6 | 0.0834 | 10.6 | 0.1227 | 11.6 | 0.1552 |
| 8.7 | 0.0403 | 9.7 | 0.0877 | 10.7 | 0.1262 | 11.7 | 0.1582 |
| 8.8 | 0.0455 | 9.8 | 0.0919 | 10.8 | 0.1297 | 11.8 | 0.1611 |
| 8.9 | 0.0506 | 9.9 | 0.0960 | 10.9 | 0.1331 | 11.9 | 0.1639 |
| 9.0 | 0.0556 | 10.0 | 0.1000 | 11.0 | 0.1364 | 12.0 | 0.1667 |

An example and comparison of old and new methods follow:

### Old Method

Compute total straight time earnings with perhaps a result of $11.56 for a day of 9.8 hr.

The total earnings of $11.56 would then be divided by 9.8 hr. for an average of $1.18 per hr.

This $1.18 per hr. divided by 2 would result in a half rate per hour of $0.59.

Then the final computation would be the multiplication of the half rate, $0.59 per hr. by 1.8 overtime hours.

0.59 x 1.8 hr. would result in a total overtime earning of $1.06.

### New Method

Compute total straight time of $11.56 as in the example above.

Multiply $11.56 by the factor shown beside 9.8 hr., total hours worked, with this result: $11.56 x 0.0919 (9.8 hr. factor) = $1.06, total overtime earnings.

Therefore, from the example shown, the advantage of this simplified method may be seen, in so far as saving time is concerned.

The range in hours worked on this chart as shown is from 8.1 to 12.0 hr., as in most cases this is ample to cover average overtime work. However, it is possible to extend these hours to cover any possible combination that may be needed to compute overtime earnings in excess of 8 hr. per day.

In connection with the computation of overtime earnings, the problem of dividing these premiums for various accounting charges is ever present.

Of course when entire overtime earnings for any one employee is charged to only one account no division of earnings is necessary. However, in a number of cases these earnings must be divided between two or more accounts due to regulations established by certain accounting methods.

In conjunction with this problem Table II has been compiled to aid in this process and based on the same principle, in that multiplication is faster than a combination of division and multiplication.

Again using the first example, in so far as overtime earnings are concerned, which showed the overtime premium to be $1.06 with 1.8 overtime hours, and supposing that 0.6 of an hour is to be charged to one payroll account and 1.2 hr. to another using the old method, again it would become necessary to divide 1.8 into $1.06 to find the half rate per hour. This could be used in extending the premium for each account, the result would be as follows: $1.06 total overtime divided by 1.8 hr. or $0.59 per hr. This $0.59 per hr. would then be used in extension by multiplying same by 0.6 hr. and 1.2 hr. respectively.

### New Method

Multiply total overtime earnings ($1.06) by the factor shown for 1.8 overtime hours (0.556) with a result of $0.59 per hr.

The final computation would then be made as shown under "old method."

Therefore, in each of the above

# Overtime Premiums . . .

By E. J. Gorski
*South Bend, Ind.*

cases the long process of division is eliminated and a simple multiplication is substituted.

In order to complete the process of simplification, the problem of computing overtime earnings for the sixth day was presented.

In computing the premiums for the sixth day, if the entire day's work is to receive time and one half compensation, it is necessary only to multiply total earnings by 0.50 to compute overtime premiums. However, again due to existing legislation, if the worker does not have 40 regular hours at the end of the first five days, in a given work week, any time worked on the sixth day, up to a total of 40 hr. would be paid on a straight time basis; consequently when a condition such as the above exists only the hours in excess of 40 hr. for the week would be paid for at time and one half.

In a factory working fairly uniform hours these conditions do not arise very frequently, but when they do, they must be reckoned with and again the old method of dividing and multiplying would be called upon.

In this case as in the two previously presented cases Table III was prepared which when used with the total straight time earnings for the sixth day and multiplied by the factor shown beside the total hours worked, results in the half rate per hour.

This half rate is then to be used in extending total overtime earnings for the sixth day by multiplying this half rate by the number of hours which are to receive time and one half compensation.

***. . . Although not mathematically complicated, the computation of overtime premiums frequently is a time consumer. Therefore, this simplified method has been devised, the result being greater accuracy with greater speed.***

### Example

Man working 8 hr. on the sixth day, but is to receive time and one half for only 6.8 hr.

Total straight time earning for sixth day, $8.64.

$8.64 x 0.0625 (factor for 8 hr.) = $0.54 *half rate* per hr.

This half rate ($0.54) multiplied by 6.8 hr. would equal $3.67 as total overtime premium for time in excess of 40 regular hours as worked on the sixth consecutive day of a given work week.

Therefore, the entire simplification program as outlined in the foregoing article is based simply on the proven fact that a time clerk with the aid of a calculator can multiply faster and produce more accurate results than possible when both division and multiplication must be employed.

## TABLE II

Multiplying Factors to Be Used Where Overtime Earnings Are Charged to More Than One Account

| Total Overtime Hours | Multiplying Factor | Total Overtime Hours | Multiplying Factor |
|---|---|---|---|
| 1.1 | 0.909 | 2.6 | 0.385 |
| 1.2 | 0.834 | 2.7 | 0.370 |
| 1.3 | 0.769 | 2.8 | 0.357 |
| 1.4 | 0.714 | 2.9 | 0.345 |
| 1.5 | 0.667 | 3.0 | 0.333 |
| 1.6 | 0.625 | 3.1 | 0.323 |
| 1.7 | 0.588 | 3.2 | 0.313 |
| 1.8 | 0.556 | 3.3 | 0.303 |
| 1.9 | 0.526 | 3.4 | 0.294 |
| 2.0 | 0.500 | 3.5 | 0.288 |
| 2.1 | 0.476 | 3.6 | 0.278 |
| 2.2 | 0.455 | 3.7 | 0.270 |
| 2.3 | 0.435 | 3.8 | 0.263 |
| 2.4 | 0.417 | 3.9 | 0.256 |
| 2.5 | 0.400 | 4.0 | 0.250 |

## TABLE III

Factors to Be Used When Calculating Premiums on Work Done in Excess of a 40-Hr. Week When Time and a Half Applies

| Total Hours Worked | Multiplying Factor | Total Hours Worked | Multiplying Factor | Total Hours Worked | Multiplying Factor | Total Hours Worked | Multiplying Factor | Total Hours Worked | Multiplying Factor |
|---|---|---|---|---|---|---|---|---|---|
| 4.0 | 0.1250 | 5.2 | 0.0962 | 6.4 | 0.0782 | 7.6 | 0.0658 | 8.8 | 0.0568 |
| 4.1 | 0.1220 | 5.3 | 0.0944 | 6.5 | 0.0770 | 7.7 | 0.0650 | 8.9 | 0.0562 |
| 4.2 | 0.1191 | 5.4 | 0.0926 | 6.6 | 0.0758 | 7.8 | 0.0641 | 9.0 | 0.0556 |
| 4.3 | 0.1163 | 5.5 | 0.0910 | 6.7 | 0.0747 | 7.9 | 0.0633 | 9.1 | 0.0550 |
| 4.4 | 0.1137 | 5.6 | 0.0893 | 6.8 | 0.0736 | 8.0 | 0.0625 | 9.2 | 0.0544 |
| 4.5 | 0.1112 | 5.7 | 0.0878 | 6.9 | 0.0725 | 8.1 | 0.0618 | 9.3 | 0.0538 |
| 4.6 | 0.1087 | 5.8 | 0.0862 | 7.0 | 0.0715 | 8.2 | 0.0610 | 9.4 | 0.0532 |
| 4.7 | 0.1064 | 5.9 | 0.0848 | 7.1 | 0.0705 | 8.3 | 0.0603 | 9.5 | 0.0527 |
| 4.8 | 0.1042 | 6.0 | 0.0834 | 7.2 | 0.0695 | 8.4 | 0.0595 | 9.6 | 0.0521 |
| 4.9 | 0.1021 | 6.1 | 0.0820 | 7.3 | 0.0685 | 8.5 | 0.0588 | 9.7 | 0.0516 |
| 5.0 | 0.1000 | 6.2 | 0.0807 | 7.4 | 0.0676 | 8.6 | 0.0582 | 9.8 | 0.0511 |
| 5.1 | 0.0981 | 6.3 | 0.0794 | 7.5 | 0.0667 | 8.7 | 0.0575 | 9.9 | 0.0505 |
| | | | | | | | | 10.0 | 0.0500 |

# Recent Developments In Swaging

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WARTIME requirements, principally in aircraft, have brought three changes in the swager to meet specific needs. First, the cable swager produced for years by Standard Machinery Co., Providence, for attachment of shank fittings has been redesigned into a fast, automatic die opening and automatic feeding unit requiring only 3 sec. for each operation. Second there is the Hydro-Former, used not only for swaging ball fittings on cable, but also for the attachment of tube to solid fittings, balls to rods, hose to flexible tubes and for finishing a wide range of circular forms from tubing and bar stock. Lastly, Standard has developed for the Navy an all-purpose swager for attaching aircraft fittings to steel cable that is now available for general use.

The automatic cable swager, Fig. 1, has increased production in the attachment of fittings as much as 15 times through the use of a quick acting die opening device and automatic feed, with the resultant elimination of the extra operator formerly required and the necessity of removing dies for each cable swaging operation in which large end fittings are used. There are other operations in production manufacture to which this machine is adapted, such as swaging a shank fitting around a rod or tube or attaching tubing to a pin type fitting or another smaller diameter tube.

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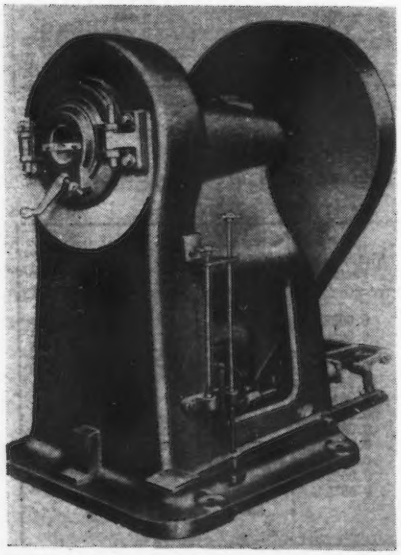
FIG. 1—New automatic die opening cable swager showing centering guide, die control lever on door and foot pedal that sets work feed into action.



While the cable swager utilizes the rotary swaging action for working the shank metal of the fitting around the cable strands, the operation is simplified by hand control for opening and closing the dies from the front of the machine while it is running. The cycle of operation consists of passing the fitting that is loosely hung over the end of the cable through the open dies into the adjustable feed socket. With the cable end held firmly against the bottom of the fitting, the handle on the door front is swung to a vertical position to start the swaging action, the foot treadle released and the work moved automatically from back to front through the dies to the completion point. At which time the dies are opened. Fittings are given a smooth surface, Fig. 2, and are swaged so firmly to the cable that the fitting and cable strands appear to be fused.

Four sizes of Standard cable swaging machines are offered to handle cable sizes from 1/16 to 1½ in.

The numerous applications of the Standard Hydro-Former, Fig. 3, are accomplished by the use of hydraulically operated wedges, making it possible in one operation to shape metals without cutting and to join them without rivets or welds, Fig. 4. The wedges are retracted for the insertion of work and then advanced—by foot or automatic control—to close the dies at speeds best adapted for each job. As wedges advance, the pressure of the dies on the work is increased to the point of shaping solids or atttaching fittings by plastic flow. When the forming operation is complete, the wedges are retracted and the dies are thrown open by centrifugal force.

Adjustable work stops are provided within the spindle for the control of dimensions. Automatic wedge control may be provided so that if the work is positioned and comes in contact with the work stop, the wedges close the dies.

Movement of the wedges is by a hollow tube whose advance or retraction is controlled by a hydraulic cylinder. Speed of die closing is adjusted by a regulating valve governing the pressure in the system and fluid pressure is directed to either end of the cylinder by a pedal control valve. The hydraulic pump is driven off the rear of the main drive motor.

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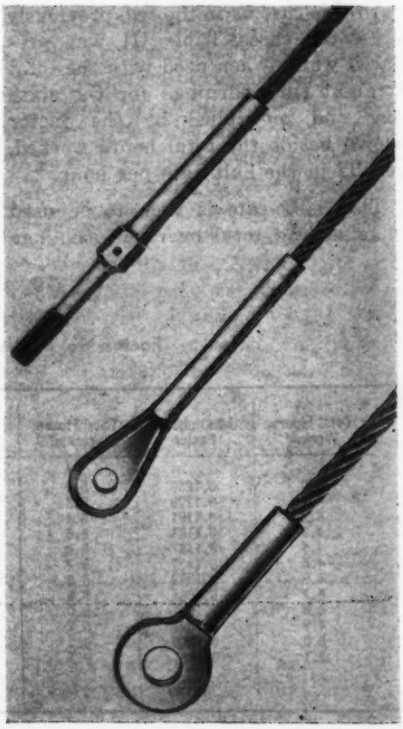
FIG. 2—Examples of shank type fittings as swaged on cable by cable swager.



Tube Attachment to Solid Fitting
Hose & Flexible Tube Fittings
Union of Tubes
Ball and Rod Attachment
Metal Forms from Solid Bars
Ball Fitting on Cable

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LEFT

FIG. 4—Typical applications of work done by Hydro Formers.

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Three sizes and designs of the Hydro-Former are available. The No. 1 Hydro-Former, a bench model weighing 140 lb., has manual wedge operation and is designed for use on tubing up to ¼ in. and bar stock to ⅛ in. diameter. The No. 2 machine, weighing 3300 lb., handles tube sizes up to 1 in. and bar sizes to ½ in. diameter, while the No. 3 unit weighs 27,100 lb. and will form tubing up to 6 in. in diameter and solid stock to 3¾ in. in diameter.

The special all-purpose swager, primarily designed for light jobbing duty and repair work, corresponds in size to Standard's regular No. 4A, and is adapted to cable work of any size from 1/16 to 1¼ in. through a series of die changes and multiple swaging steps. Each step necessitates stopping the machine with a quick acting brake and replacing dies with the next smaller size. Ordinarily, fittings are swaged to 1 or 1¼ in. cable in one step in about 1 min. with a No. 8A swager weighing 26,000 lb. By contrast, the all purpose model, which weighs only 3800 lb., requires three swaging steps and approximately 15 minutes.

These three designs have adopted the principles of rotary swaging to production uses that are said to permit economies of manufacture heretofore unknown. Automatic feeds can be arranged for handling the work through the swaging cycle so that a low labor cost can be held. Also, the maintenance costs are low since the hammers, dies and rollers that withstand 95 per cent of the force in the working are cheap and readily replaceable. The initial capital investment is also low.

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FIG. 3—No. 2 Hydro Former showing V-belt drive, hydraulic pump and foot pedal for wedge control.

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# Age Hardening Alloy Eliminates Solution Treatment

A NEW precipitation hardening alloy of 60 per cent copper, 20 per cent nickel and 20 per cent manganese has been announced by the W. M. Chace Co., Detroit. Among the properties claimed for this alloy are its corrosion resistance and uniformity in response to heat treatment. Although more than half copper in composition, it has a silvery color and presents an attractive surface when polished.

The alloy is said to be soft and ductile and can be either hot or cold formed into intricate shapes and then hardened by an aging treatment at 750 deg. F. Hardening to any degree between dead soft and full hard is produced by varying the time at the single aging temperature which may be varied 100 deg. F. without affecting the resultant hardness. A hardness of 400 Vickers can be readily obtained, it is claimed, by aging either dead soft or cold worked material. Physical properties corresponding to this hardness are: Tensile strength, 200,000 lb. per sq. in.; yield stress for 0.1 per cent offset, 170,000 lb. per sq. in., and a proportional limit of 120,000 lb. per sq. in. Freedom from drift and high fatigue strength make the alloy especially useful as a spring material.

For a full anneal, hardened parts may be heated a few minutes at a temperature between 850 deg. and 1100 deg. F. To reharden material softened in this manner, it is only necessary to repeat the aging treatment. The elimination of a solution treatment as a pre-requisite to aging greatly simplified the heat treating procedure and accounts for much of the uniformity of physical properties claimed for the alloy.

This material, known as No. 720 Manganese Alloy, is available in all the forms in which stainless steel is usually supplied and is recommended for use in corrugated diaphragms, bourdon tubing and temperature or pressure responsive bellows.

# Refractory Molds For Precision Casting

***. . . The author concentrates on the refractory mold as the critical feature in the process, and has amassed much information on the binder used for high temperature investments.***

o o o

By JULES W. GLASER
*Yonkers, N. Y.*

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THE characteristic qualities of precision castings—dimensional accuracy, surface smoothness, intricate design possibilities, reproduction of fine detail, coupled with excellent metallurgical and physical properties—are attributable, in the main, to two features of the process:

1. The method used for the preparation of the refractory mold which receives and shapes the charge of molten metal.

2. The application of pressure upon the metal while it is solidifying in the mold. This pressure, usually provided by centrifugal force in a spinning mold or by air pressure in a stationary mold, is generally greater than can be conveniently attained by the application of risers and headers as employed in foundry practice.

The advantages of pressure casting have gained ever widening recognition in recent years. The gains in yield and in the improved metallurgical characteristics of the castings have, indeed, impelled foundries to adopt centrifugal casting techniques wherever suitable to particular products.

It is the purpose of this article to discuss some of the pertinent considerations and techniques which apply to the production of the unique refractory molds employed in precision casting.

The principal steps of the molding method are:

1. The formation of expendable wax or plastic replicas of the object to be cast, a separate pattern being required for each single casting to be produced.

2. The aggregation of a number of such patterns around a main feeder by means of appropriate sprues.

3. The imbedding (investing) of the pattern aggregate in a plastic or semi-liquid refractory mass (investment) retained by a metal cylinder (flask ring).

4. The elimination from the investment material of air and excess liquid binder in order to obtain a dense refractory mass and a continuous, smooth, closely adherent surface against the patterns by means of vacuuming, vibrating, and/or tamping.

5. After the mold has set, the utilization of the expendable patterns to produce the cavities which will receive the molten metal—the procedure which has given rise to the name, "lost-wax process."

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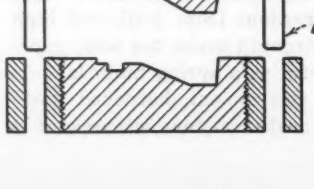
FIG. 1—Better matching of the two halves of a soft metal mold can be accomplished by the use of encasing rings and dowel pins.




The formation of satisfactory ex pendable patterns is most crucial t the attainment of the desired result in precision castings. The exactnes of size, surface detail and contou with which the metal castings ar capable of reproducing the pattern immediately precludes the possibilit of obtaining perfect castings with re spect to these characteristics unles the most rigid control and inspectio is brought to bear upon the patter department.

The first important factor affectin results in this department is the typ of mold employed to form the pat terns. Three classes of molds ar recognized, namely: rubber mold soft metal molds (Wood's metal, Cer robend, etc.) and steel molds.

The facility and speed with whic rubber molds may be made woul seem to warrant serious consideratio for them. However, their lack of rigid ity and high shrinkage upon vulcan ization limit their application to case where dimensional accuracy is of de cidedly secondary importance, as i the case of most jewelry items.

Greater dimensional accuracy ca be achieved in the soft metal mol but it is necessary to make a maste pattern, incorporating shrinkage a lowances and machined to much nar rower tolerances than might be per missible for the castings to be mad from it. Experience on a great variet of parts indicates that the cost of th master pattern plus the cost of th soft metal mold so closely approache the cost of a steel mold as to mak the latter the preferred choice. Fur thermore, the soft metal mold has relatively limited productive life span The application of heat and pressur through repeated injections of ho wax, soon causes distortion to a sig nificant extent and the exposed shar edges are rounded off, unless the mo rigid supervision is exercised.

To some extent failures caused forcing the split halves together in unmatched position may be minimiz by encasing the soft metal mold in permanent split shell made of alum

num, bronze or steel, and fitted with dowel pins of sufficient length to guide the two halves of the mold into matching position before the soft metal surfaces come into contact. (See Fig. 1.)

One economical use of the soft metal mold is that of determining exact shrinkage allowances to be subsequently made in the more costly steel mold. For this purpose a stock part is suitable as a master pattern, since dimensional comparison of the stock part and the casting produced from it will indicate the precise shrinkage across all sections. These figures can then be added to the dimensions specified on the blueprint and the steel mold be made accordingly.

Rubber and soft metal molds under certain conditions have proved to be very useful devices in the precision casting shop but their limitations definitely point to the use of steel molds for accurate production work of large quantities.

## Locating Sprues

The choice of mold type having been made, attention must next be paid to the location and size of sprues and to providing proper vents. Where large flat areas are presented by the surfaces of a particular part, and especially where such surfaces occur over a fairly massive cross-section, one of the most common failures in the expendable pattern is the partial collapse of such surfaces into concavities. The greater the shrinkage characteristics of the wax used and the greater the cross-sectional area of the pattern, the more pronounced will be this effect, other factors being equal.

Injection of the wax under pressure usually offers a remedy for this condition. The cross-section and location of the sprue must be such as to cause directional solidification of the wax. Starting at the point most remote from the sprue, solidification should proceed through increasing cross-sectional areas, and through the sprue to the injection tip, where a constant supply of molten wax can be maintained under pressure to compensate for the reduction in volume as the wax cools and shrinks. In some cases, indeed, the design of the pattern may be such with respect to variations in section that the use of more than one sprue is indicated.

The basic design of the pattern aggregate, that is, the position in which the expendable patterns are attached to the main feeder or sprue base, is determined

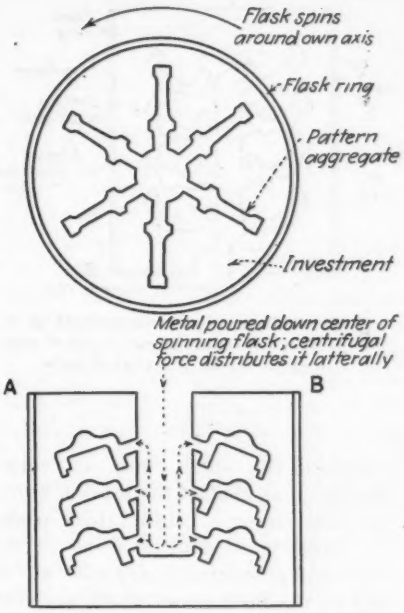



FIG. 2—Arrangement of patterns in a flask which is spun about its central axis.

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by the casting method. Some typical aggregates are shown in Figs. 2, 3 and 4. In preparing the pattern aggregate for casting by static pressure, as differentiated from centrifugal casting, a much greater flexibility in design is permissible since the force acting upon the molten metal is not unidirectional.

Whatever the design of the pattern aggregate may be, there is a significant precaution to be taken with respect to the mounting of each individual pattern in relation to that end of the flask ring which is on the bottom while the investment is being poured into it and the vacuuming and/or tamping is taking place. (Line *AB* in Figs. 2, 3 and 4.) The object of vacuuming and tamping is not only to remove air absorbed by the investment, but to remove air bubbles or excess liquid which might adhere to the pattern surfaces or trapped under a horizontal flat surface or a concave surface facing down. Such a condition will cause an investment void contiguous with the mold cavity after the wax is eliminated and will result in a corresponding protrusion on the surface of the casting. It is imperative therefore to mount the patterns upon the sprue base in such a manner that flat or concave surfaces will slant upward during the investing process.

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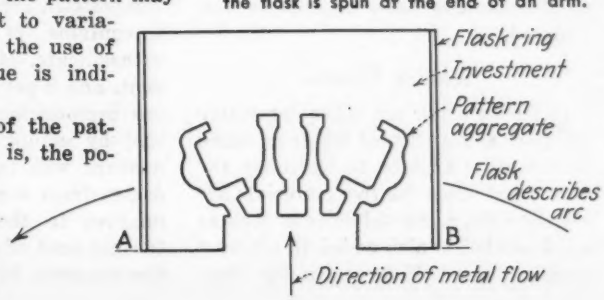
FIG. 3—A typical arrangement of patterns in centrifuging practice in which the flask is spun at the end of an arm.




## The Investment

Investment materials, particularly those for use with metal which melt above 2000 deg. F., are currently the subject of much intensive research. While the materials now available yield very satisfactory results, they leave much to be desired with respect to cost and ease of handling. These materials were originally prepared for dental and surgical appliance and for jewelry casting, and for these applications the investment cost represents only a very minor part of the value of the final product; also, the quantities in total demand as well as the size of the unit packages were very small. However, the lively interest which has been shown in investment materials for use in industrial precision casting is bringing new competitive producers into the picture, and has brought about an expansion in manufacturing facilities of the existing producers, so that it is now possible to look forward to early and sizable reductions in cost and overall improvements in performance.

In general, investments are mixtures of graded particles of refractory materials, such as silicon oxide, magnesium oxide, zirconium oxide, etc., and a liquid binder which forms a plastic or semi-liquid mass with the refractories and cause the latter to acquire a more or less rapid set after being poured around the pattern aggregate.

For nonferrous castings, the most widely employed investment material is a mixture of silicon oxide and plaster of Paris. When mixed with water, the plaster of Paris unites with it to form a solid, hydrated calcium sulphate,

$$(CaSO_4)_2.H_2O + 3H_2O \rightarrow 2[CaSO_4.2H_2O]$$

Cristobalite, a typical investing material which is manufactured by the Kerr Dental Mfg. Co., 6081 12th Street, Detroit 8, is a refined formulation based upon the above reaction. The technique of handling this investment is discussed in the article, "Equipment and Material for Precision Casting," THE IRON AGE, Nov. 9, 1944.

Among the high temperature type of investments and one which has met with much success, is a mixture of

graded refractory particles and a binder made from ethyl silicate, produced by Carbide and Carbon Chemicals Corp., 30 East 42nd Street, New York 17. While the physical properties of ethyl silicate have been described in the aforementioned article further discussion of its chemistry and the technique of its application to precision casting may prove useful.

Tetraethyl orthosilicate has the formula $SiO_4(C_2H_5)_4$, or

$$\left.\begin{matrix} C_2H_5.O \\ C_2H_5.O \\ C_2H_5.O \\ C_2H_5.O \end{matrix}\right\} Si$$

"Condensed" ethyl silicate consists predominately of tetraethyl orthosilicate together with some polysilicates. The addition of water to the ethyl silicate results in the formation of ethyl polysilicate and ethanol ($C_2H_5OH$) which immediately begins to evaporate. As more water is added, silica ($SiO_2$) is precipitated and more ethanol is formed and evaporated.

The use of ethyl silicate as a binder for the preparation of refractory molds for precision castings depends on the preparation of a solution which, upon the evaporation of alcohol and subsequent dehydration, will deposit a tenacious silica bond in the interstices of the refractory grains. As hydrolysis proceeds and alcohol is volatilized, the silica is first deposited as a sticky colloidal gel. As the gelatinous mass becomes dehydrated, considerable shrinkage takes place, and should there be a local accumulation of the gel on the underside of the expendable patterns, or an excessive amount of the gel distributed through the mold, deep cracks or web-like fissures will appear in the mold with disastrous effects upon the castings. Proper control over the gel distribution is therefore most important.

When the binder and the refractory powder are mixed, enough of the liquid binder must be added to attain a sufficient flow of the mixture so as to permit complete fill-in against the pattern aggregate. This quantity of liquid binder, however, is far in excess of the amount required to just fill the interstitial spaces between the refractory granules. In the "as-mixed" investment, each granule is blanketed by a layer of the binder which—as the hydrolysis progresses—turns into the aforementioned gel, Fig. 5. The purpose of tamping the investment after it is poured is to pack the refractory granules into contact with one another, and to force the excess binder to the top of the flask, where it may be either poured off or cut off after it has gelled. Tamping will naturally

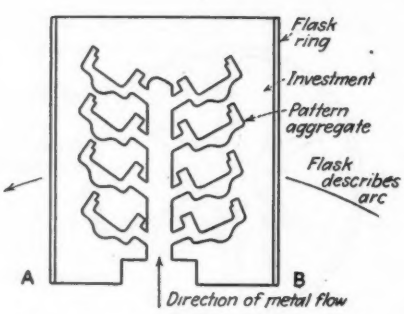



FIG. 4—Economical arrangement of a pattern aggregate about a rod of wax which serves as the central gate.

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compact the solids into a volume smaller than that of the total mixture. For this reason a 1/16 in. thick asbestos sheet is used as a lining in the flask and permitted to protrude at the top of the flask about 20-30 per cent of the flask length. Enough investment is poured into the flask to fill it to the top of the liner, so that after tamping the solids will settle to the top edge of the flask and the excess liquid will be retained by the protruding asbestos collar, Fig. 6.

The factors which have a bearing upon the successful elimination of excess binder are as follows:

(1) The initial viscosity of the liquid binder prior to mixing with the refractory.

(2) The rate of setting of the poured investment.

(3) The mesh size of the refractory granules.

(4) The amplitude and frequency of the tamping.

## Binder Viscosity

The viscosity of the liquid binder just prior to being used is of consequence since the greater this viscosity the less readily will the refractory granules settle and excess liquid accumulate as a supernatant layer. The viscosity of the binder increases rapidly as hydrolysis progresses and gel formation occurs. This process is also pronounced in solutions which have been kept long, have been stored in a warm place, have had too much acid or alkaline accelerator added, or which have otherwise been improperly formulated.

## Solution Charts

In formulating the silica-depositing solution, a quantity of water is added to the ethyl silicate to hydrolize the latter, and since the two materials are not miscible, a mutual solvent such as ethyl alcohol is also added to act as a coupling agent. However, if the ethyl silicate content of the three-component mixtures exceeds 57 per cent, separation occurs in the presence of sufficient water to complete the hydrolysis.

The properties of the three-component system resulting from the admixture of various ratios of ethyl silicate, Synasol[1] solvent and water have been investigated and plotted in the triangular co-ordinate charts (Fig. 7 and 8) reproduced here, with the accompanying discussion, by courtesy of the Carbide and Carbon Chemicals Corp. One of these charts is for tetraethyl orthosilicate, while the other is for ethyl silicate, condensed.

[1] *Synasol solvent is a proprietary product of Carbide and Carbon Chemical Corp., and consists of ethyl alcohol denatured with wood alcohol, ethyl acetate, and gasoline.*

Consider the properties of the chart, Fig. 7, for the tetraethyl ortho-

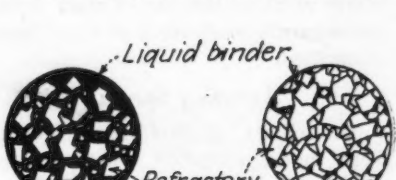


FIG. 5—Illustrating the advantage of tamping. At "A" the investment has not been tamped. The refractory particles are surrounded by a relatively heavy layer of the liquid binder. On evaporation of the liquid, the unsupported particles pack together resulting in cracks. At "B" the tamped particles are already compacted and no further reduction in volume is possible.

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silicate. Each corner of the triangle represents a composition containing 100 per cent by volume of one component. Points located on the perimeter of the triangle represent compositions containing only two components. For example, the point marked 60 on the lower edge of the chart represents a solution whose composition is 60 per cent 190-proof Synasol solvent and 40 per cent water. All points within the boundaries of the triangle represent compositions containing three components in quantities proportional to the distance from the corners. Thus the composition represented by point No. 2 contains 74 per cent tetraethyl orthosilicate, 24 per cent Synasol solvent, and 2 per cent water. The various compositions which may be realized by adding one component to a mixture will fall on a straight line drawn from a point representing the mixture to the corner representing 100 per cent of the added component. For example, by adding water to the

composition represented at 2, compositions falling on the line through 2 and 2H are obtained; the addition of 7 volumes of water to 100 volumes of the composition represented by 1 gives the composition indicated by 2H.

These are considerations which apply to all three-component systems. With particular regard to the ethyl silicate charts, the miscibility curve is a boundary line between solutions (to the left of the curve) and nonmiscible mixtures (at the right, containing smaller amounts of Synasol) which give two liquid phases when mixed. On chart, Fig. 8, for ethyl silicate, condensed, the miscibility curve, if completed, would proceed down into the right to terminate in the vicinity of the corner corresponding to 100 per cent water.

As the reaction of ethyl silicate with water takes place, more ethanol and silicic acid are produced and an apparent shifting of the miscibility curve to the right occurs so that additional water may be added without separation into two liquid phases. For this reason compositions in the immiscible area may be prepared and, if not too much water is present, they may be mixed and allowed to react in the heterogeneous two-layer system until a homogeneous solution is obtained. (In some solutions, especially those made with ethyl silicate, condensed silica may separate giving cloudy solutions. This cloudiness is not to be confused with immiscibility of the liquid components.)

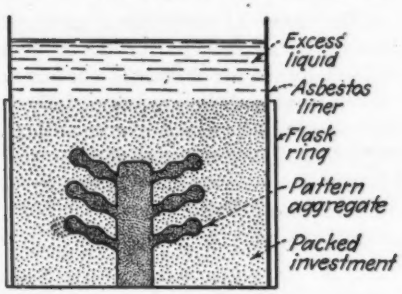


FIG. 6—Separation of excess liquid after tamping of ethyl silicate type of investment.

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Line *AB* on the tetraethyl orthosilicate chart, Fig. 7, represents compositions containing the correct theoretical ratio of water to ethyl silicate to give complete hydrolysis of the ester to $SiO_2$. (The fact that this line extends outside the bounds of the chart is because of the use of 190-proof Synasol solvent. In a composition containing no added water, a mixture of about 77.5 per cent Synasol solvent and 22.5 per cent tetraethyl orthosilicate contains sufficient water introduced with the Synasol to convert the ester to silica.) It is doubtful whether any useful purpose is served by preparing solutions containing larger amounts of water than are present in the compositions indicated by those lines—except where the water is desired as a diluent. On the other hand, it has been found that for many purposes the most useful solutions are obtained by using slightly less than the amount of water theoretically required to convert the acid to silica. The reason is that a portion of the ester is then converted only to a condensed resinous material which tends to improve the adhesive nature and to preserve some flexibility of the silica film as the solvent evaporates. The relatively small additional amounts of water required to complete the hydrolysis in such a case is subsequently absorbed from the surroundings. For this reason point 2H (S-2H) in Fig. 7 and point 3H (S-3H) in Fig. 8 are slightly to the left rather than exactly on the lines representing sufficient water to convert the ethyl silicate to silica.

The dotted lines drawn across the charts represent compositions of constant silica ($SiO_2$) content. For example, the silica content of the point 2H on Fig. 7 is about 20.5 per cent.

If water, Synasol, and tetraethyl orthosilicate are mixed at one time in the proportions required to give more than 20 per cent $SiO_2$, the miscibility boundary would be crossed and separation of the liquid phase would result. This difficulty may be avoided by preparing the solution in two steps. A partially hydrolyzed solution whose composition lies to the left of the miscibility curve is first prepared. After a few hours the ethyl silicate hydrolyses to such an extent that additional water may be added without exceeding the limits of solubility. This procedure is illustrated by solutions S-2 and S-2H in Fig. 7, and solution S-3 and S-3H in Fig. 8. The solutions are prepared as follows:

## Partially Hydrolyzed Solution

**Tetraethyl orthosilicate (S-2)**

Mix 74 vol. of ester with 24 vol. Synasol solvent and 2 vol. dilute mineral acid (0.3 per cent HCl).

**Condensed ethyl silicate (S-3)**

Mix 80 vol. of ester with 18 vol. Synasol solvent and 2 vol. dilute mineral acid (0.3 per cent HCl).

Allow these solutions to stand at least 12 hr. before using. The partially hydrolyzed solutions are stable for many months.

## Completely Hydrolyzed Solution

**Tetraethyl orthosilicate (S-2H)**

Mix 100 vol. of partially hydrolyzed solution (S-2) with 7 vol. $H_2O$.

**Condensed ethyl silicate (S-3H)**

Mix 100 vol. of partially hydrolyzed solution (S-3) with 8 vol. $H_2O$.

Allow these solutions to stand at least 8 to 12 hr. before using. Completely hydrolyzed solutions should be used within a few days since they will gell in the container in a week or two.

This final hydrolysis can be accelerated by the addition of acids or bases. HCl is usually employed at concentrations of from 0.05 to 5 per cent (in the water to be added) de-

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FIG. 7—Chart illustrating miscibility of ethyl orthosilicate, Synasol and water at room temperature, also hydrolysis data. (Mixtures by volume.)

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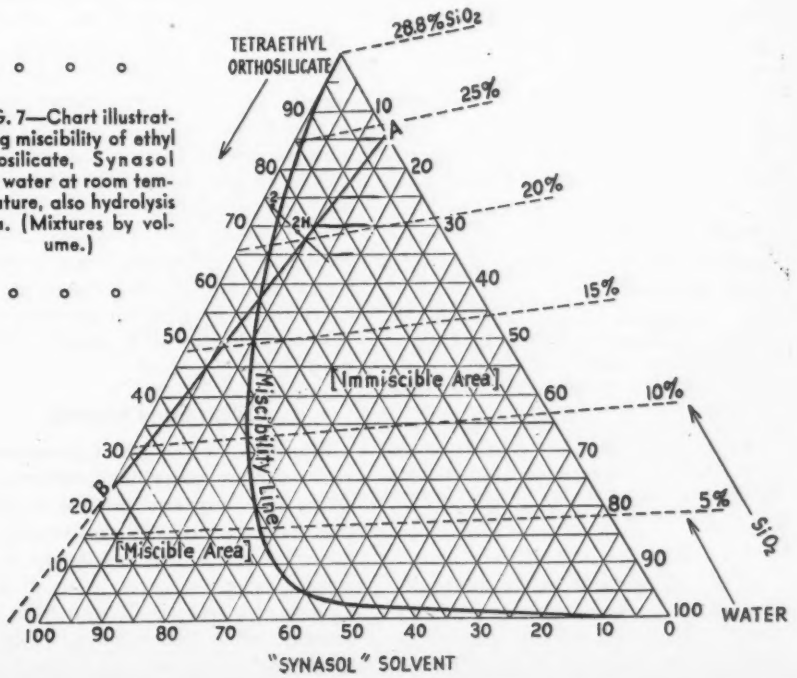

pending on the desired speed of setting and the amount of acid that can be tolerated in the finished product. In the initial stages the setting of ethyl silicate from solution is dependent on evaporation of the alcohol so that the time required for hardening is largely a function of temperature and air circulation.

In some cases it may be advantageous to prepare a silica depositing solution in one step. Such a solution is represented by point 1 (S-1) in Fig. 8 which has the following composition: 32 vol. Synasol, 60 vol. ethyl silicate, 8 vol. water.

This solution has the greatest potential $SiO_2$ content which can be obtained from a homogeneous system on one step hydrolysis.

## Accelerating Hydrolysis

The use of a solution requiring a two-stage hydrolysis presents a production burden to the molding department, both as to handling and as to the waiting period. The requirements for the refractory mold in precision casting permit the use of solutions containing a proportion of ethyl silicate considerably less than that which necessitates a two-stage hydrolysis. The S-1 formula mentioned above, which contains 35 per cent of the condensed ethyl silicate, has been found to be eminently satisfactory as well as economical. The addition of about 0.3 per cent hydrochloric acid to the requisite quantity of water accelerates the hydrolysis sufficiently to permit the use of the binder within 2 hr. after preparation. In preparing the binder, the acidulated water should first be mixed with the alcohol and the resultant solution should then be added, with stirring, to the ethyl silicate. The hydrolysis of the ester is an exothermic reaction, and a marked rise in temperature will be noted shortly after the water is incorporated with the ethyl silicate. Within about 10 min. after mixing, the solution should be stored in a cold chamber (approximately 45 deg. F.) until ready for use.[2]

[2] *Some precautions in the handling of ethyl silicate should be observed. Although not very volatile at ordinary temperatures it is best to avoid exposure to the concentrated vapor as well as contact with the skin or eyes. Ethyl silicate should be kept away from heat or open flame, but it is much less flammable than the alcohol used in making up the solutions.*

It will be noted from the above discussion that considerable latitude exists in the formulation of a silica depositing solution, but it must be emphasized that no beneficial purpose is served by using more ethyl silicate than the minimum required to furnish a sufficiently strong bond in the refractory mold to withstand the necessary handling and the stresses to which the mold is subjected during casting. When cracks appear in the mold, the natural tendency is to attribute such failure to the lack of sufficient binder, or to too little of the ester in the binder. The reverse is generally the case. Too little binder will result in a relatively soft mold, which will readily pulverize when rubbed or crushed. Too much or too rich a binder, on the other hand, will result in the retention of an excessive quantity of the colloidal gel between the refractory particles and this in turn will cause spontaneous cracking upon drying and subsequent shrinkage.

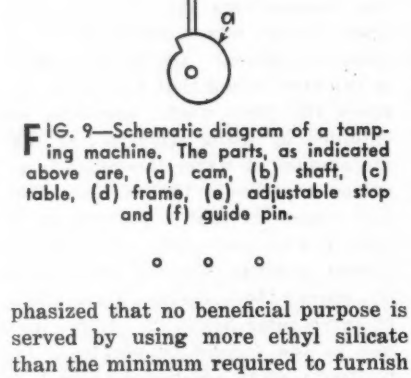


FIG. 9—Schematic diagram of a tamping machine. The parts, as indicated above are, (a) cam, (b) shaft, (c) table, (d) frame, (e) adjustable stop and (f) guide pin.

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The rate of setting also has a bearing on the successful control of cracking in the mold. Given a certain rate and amplitude of tamping in relationship to the height of the mold and the mesh size of the refractory, it is obvious that sufficient time must elapse prior to the gelling of the binder to permit the refractory granules to be compacted and the excess binder to rise to the top of the flask. Should a satisfactory separation of excess binder fail to materialize, the cause of such failure may be found in the addition of too large an amount of the acid or alkaline accelerator to the liquid binder or to the dry refractory.

## Silica Sand Meshes

Similarly, the choice of proper mesh size in the refractory mixture will affect not only the surface finish of the castings but will significantly influence the inherent resistance of the mold to develop cracks. Too uniform a mesh size will result in a high percentage of voids with a resultant structural weakness; too large a proportion of "fines" or too small a mes
size will result in a large surface are
per volume and thus a large volume
binder adsorbed to the particle su
faces with a correspondingly greate
shrinkage taking place as the binde
is dehydrated. Also, the finer the r
fractory particles the greater the
tendency to remain in suspension
the binder.

While the proper sizing and grad
of the refractory may be determin
empirically to suit the requiremen
of specific conditions, the followi
has been found satisfactory in ma
applications and may be used as
starting point:

| Silica Sand Mesh | Per Cen |
|---|---|
| 70-80 | 10 |
| 100 | 25 |
| 150 | 25 |
| 200 | 30 |
| 300 | 10 |

## Vacuuming and Tamping

The type of equipment genera
employed at present for the remov
of entrapped air from the nonferro
investment and the procedure follow
are described in the aforementio
article in THE IRON AGE, Nov. 9, 19
It may be of interest, however, to
the following observation.

The removal of air bubbles adh
ing to the patterns is considera
facilitated by the agitation produ
in the investment when the wa
mixed with it is brought to a vigor
boil. The vapor pressure of water
68 deg. F. is 17.5 mm. Thus, the pr
sure attained with the vacuum pu
should be sufficiently low to cause
water to boil at the operating temp
ature. This may be readily chec
by placing under the bell jar a bea
of water at the temperature used
mixing the investment and observ
whether the water is brought t
boil when the minimum pressure
tainable with the pump is reached.

When the bowl of mixed investm
is placed under the bell jar and
air pressure starts to drop, the ai
the investment begins to rise to
surface. The surface tension of
investment keeps the air bubbles f
breaking loose at the surface and
sequently a froth develops which r
to the top of the bowl and soon sp
over. However, if a low enough
uum is attained, the aqueous
breaks down, and a cleaner opera
is the result.

Vibration of the flask should no
continued after the Crystobalite
vestment has been poured into it

vacuumed. Continued vibration may cause the separation and accumulation of water on the under surfaces of the patterns resulting in corresponding rough surfaces on the castings.

With the ethyl silicate type of investment, the removal of air bubbles takes place incidentally to the tamping action which is employed to compact the refractory granules. Fig. 9 shows schematically the mechanical features of the tamping table. The cam should have a drop of at least ⅛ in. and adjustable stops under the table should be so arranged as to permit regulation of the table drop between 1/16 to ⅛ in. The cam should revolve at approximately 350-400 r.p.m.

After the investment is mixed to a rather heavy consistency—having just enough flow to spread when a lump of it is placed on the tamping table—the flasks are arranged on the table and the machine started. The flasks are gradually filled with the investment, a quantity being added to each one in turn in a repetitive cycle until the investment reaches the top edge of the asbestos liner. Tamping should be continued until the sand settles down into a compact mass under the supernatant layer of liquid. The excess liquid may be poured off from time to time, and on completion of tamping, the top of the flask should present a damp but solid and compact surface.

### Burning-out

The final step in preparing the refractory molds for casting consists of the burning-out process. It accomplishes several desirable objectives:

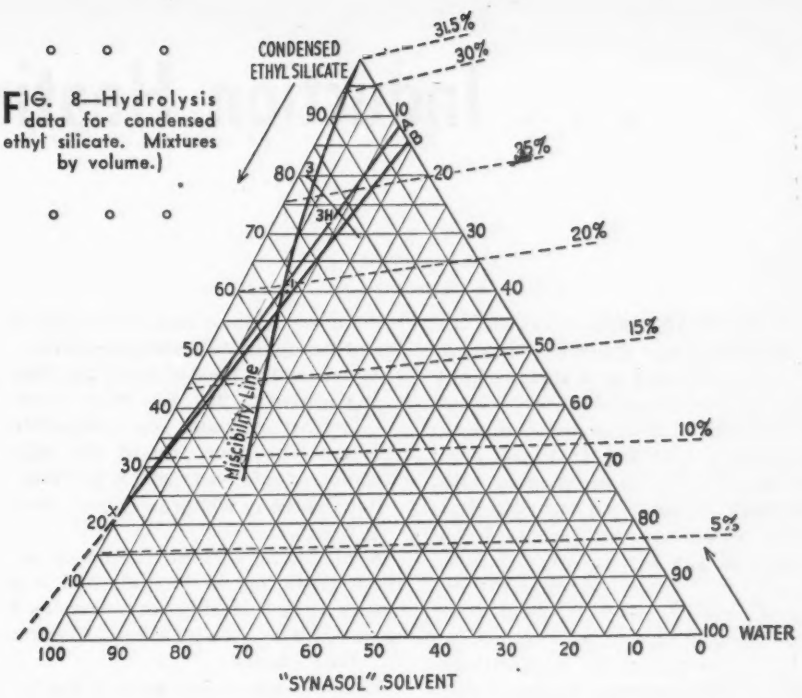



FIG. 8—Hydrolysis data for condensed ethyl silicate. Mixtures by volume.)

(1) Eliminates the volatile constituents of the investment and completes the set.

(2) Eliminates the expendable patterns.

(3) Raises the temperature of the mold to the desired level for optimum casting and solidification conditions.

The rate of temperature rise should be so controlled that the volatile constituents are not too violently evolved with consequent damage to the cavity surfaces. It is desirable to have most of the wax melt and drain out of the flasks into removable pans or into pans outside the furnace. In any case, some of the wax will be absorbed by the investment. This residual wax must be completely volatilized by raising the temperature sufficiently and for a long enough period with a sufficient supply of air to oxidize completely the carbonaceous deposit in the pores of the investment. Should the pores be clogged by residual carbon, enough opportunity will not be presented for the air in the mold cavities to escape as the metal flows in and, consequently, the castings will be unsatisfactory.

# Electronic Control of X-Ray Tubes

A NEW electronic-type of regulator, called the X-Actron stabilizer, has been developed by Westinghouse. It insures constant current in X-ray tubes where a small change in power-supply voltage makes a large difference in current delivered, that is, in the amount of "light" available for the picture. Various types of constant-voltage regulators have been used for this purpose with different degrees of success. However, the new regulator is smaller, more compact, and does a better job.

This device, which consists of vacuum tubes in a special circuit of inductances and capacitors, is in the high-voltage circuit of the X-ray tube and hence is sensitive directly to changes in the quantity desired constant—the X-ray tube current. The regulator holds the current constant by operating on the X-ray tube filament through a stepless saturable reactor. The regulator is able to hold tube current within 2 per cent plus or minus over, for example, the current range of 4 to 30 milliamp. and a voltage band of 30,000 to 150,000 volts.

It makes possible precalibrated current dials and reduces the work of the operator simply to making the current selection and pressing a button. The regulator sees to it that the tube delivers the current ordered regardless of any fluctuation in supply-line voltage or whether the set has been operating and is hot or whether it is starting cold, and regardless of the anode-cathode voltage.

# . . . Induction Heating Conference

INDUSTRIAL applications of induction and dielectric heating were discussed at a series of six meetings sponsored by the Great Lakes Power Club in cooperation with the Chicago Lighting Institute, Jan. 16-18 at Chicago. In conjunction with each meeting, induction and dielectric heating equipment pertaining to the subjects of the session were demonstrated by those manufacturers. Formal papers were supplemented by panel discussions.

The broad gamut of applications to which high frequency pertains, was detailed by Edwin D. Tillson, research engineer for Commonwealth Edison Co., Chicago. Some of these applications include:

Melting by induction heating of polystyrene patterns for investment molds for precision centrifugal castings. Heat is applied through the steel shell surrounding the investment, slowly at first to prevent alcohol impregnating the mold.

Curing by dielectric heating of molds and cores for copper base castings.

Tempering of "bobby pins" by induction heating. The work is racked on an 18 in. bar, which is introduced into an induction coil. Temperature of 550 deg. F. is achieved in ½ sec.

Sintering of powdered metal ring, in which diamond particles are imbedded, in grinding wheel manufacture. Heat of 1400 deg. is reached in 10 sec.

Heat treatment of 6 per cent chrome alloy magnet steel. Magnets are heated to 1700 deg. F. and oil quenched in 15 sec.

Blueing of SAE 1010 steel banding strap 0.022 by ⅝ in. The strap is induction heated to 650 deg. F., blueing top and side, at the rate of 1 ft. per sec. Power consumption is 80 kw. for 284,000 ft. daily.

Polymerizing of grinding wheel binding resin by dielectric heating in 10 sec.

Sealing of collapsible lead tubes by induction heating, designed to produce a more durable closure than the more common method of folding and crimping. The closure area is coated with plastic bonding film, and heated to 250 deg. F. in 1 sec.

Drying of paint on collapsible tubes. The open end of the tube is put over a rod, which is induction heated to 400 deg. Drying time is 2 min.

Applications of high frequency induction heating to brazing and low temperature soldering were described by H. U. Hjermstad, Federal Electric Co., Inc., Chicago.

Fundamental advantages of the induction method include: (1) Accurate heat control by variation of power input to the high frequency oscillator by the relationship of the induction coil to the work and by variable timing arrangements, or by combination of these methods. (2) Confining of the heated area to a narrow band which makes possible soldering or brazing without damaging plating, finishes, or perishable material in steel containers. In brazing operations this reduces scale formation, warpage and power consumption. (3) High speed, making it possible to induce energy at the rate of 100 to 250 B.t.u. per sq. in. per min. into a piece of steel. The same material placed at room temperature in a furnace with a wall temperature of 2000 deg. F. would acquire only about 3 B.t.u. per sq. in. per min.

Hjermstad pointed out that it frequently is necessary to redesign the part to be joined to obtain maximum results from induction heating for brazing and soldering. Fundamentally, he said, capillary action is the determining factor in the flow of brazing metal for solder, and an even flow between two surfaces necessitates maintenance of uniform gaps between adjacent pieces of metal.

"Strength of all joints, whether they are soft solder, hard solder or copper, will be controlled to a great extent by the thickness of the bonding material. This, of course, will be controlled again by the gap thickness. Maximum strength will be obtained on brazed connections on clearances of 0.001 to 0.003 in. Too small a gap will hinder capillary action and not give uniform contact of the brazing alloy, resulting in a reduction of strength of the weld.

"When using too large a gap, capillary action is reduced and strength of the joint is dependent to a great extent on the tensile strength of the welding material. Clearances which are too close give bare spots, for the brazing alloy is unable to flow, but with the proper clearance maximum conduction of the fluid brazing metal due to capillary action will be secured."

Data was introduced showing that high strength can be attained from soft solder if the thickness of the solder joint is closely controlled and sufficient space let for capillary action to take place.

### Uniform Fits Necessary

Hjermstad stressed the necessity of maintaining uniform fits throughout all joints that are to be brazed or soldered, declaring that induction heating can be used to the greatest advantage where only a few welds per item are to be joined. If several joints are to be welded per part, it frequently is desirable to employ furnace brazing, or, in certain instances, a combination of furnace and induction heating.

Parts to be joined should be designed, he said, so as to allow use of solder or brazing alloys in the form of either wire, foil, slugs, electro-plate, metal spray or paste, the most common being wire.

"Naturally a cylindrical form is most convenient to make and handle since an ordinary lathe and mandrel can be used for the forming of such parts. Frequently in soldering operations it is desirable to make the loop continuous and in that event, the solder ring should be in the form of a washer. This can best be obtained by using sheet stock and punching out the washer. This is especially true when making certain hermetic seals in order to insure a continuous flow of solder around the entire seal."

Precautions to be observed in various operations were illustrated, with variations described for different types of solder and brazing alloys. When brazing different types of material or thicknesses of material, con-

# Discusses Trends, Techniques . . .

***. . . New applications developed for peacetime use of induction, dielectric heating, following mass production utilization in war materiel.***

centration of the magnetic flux on the section most difficult to heat was recommended, thus allowing the part with the greatest mass or lowest electrical resistance to receive the largest amount of energy. Frequently, it was stated, the heat may be concentrated on one part, and the second part then heated entirely by conduction.

In designing coils, ample space between the coil and work was recommended, permitting the work to be placed into the coil without difficulty.

"Care should be taken in making certain that the part to be brazed is centrally located within the coil so as to attain an even rise in temperature. Frequently it is desirable to use a rotating device on certain operations in order to obtain absolute uniformity in heating.

"Care should also be taken in designing the coil so that it is not in close proximity to any sharp corners which might burn with excessive heating. This difficulty can be eliminated by having the coil follow the contour of the work. Use as few turns on the coil as possible since a large number of the fluxes used are good electrical conductors and at high temperature may cause turn-to-turn short circuits. Basically strive for the simplest type of coil that can be made," Hjermstad concluded.

## Induction Heating for Forging

Engineering and economic development of electric induction and related types of equipment, particularly lower prices for components, account for today's broad application of induction heating to forging, H. A. Strickland, Jr., Budd Wheel Co., Detroit, declared. Development of necessary components of a high frequency system has progressed with demand, with inductor type generators, high capacity power factor correcting capacitors, co-axial cable, and better insulating materials becoming available.

War time acceptance of induction heating, at its best in high production applications, has been accelerated by shortage of skilled forging labor and the opportunity to build new forging capacity without having to charge off that already existing, he said.

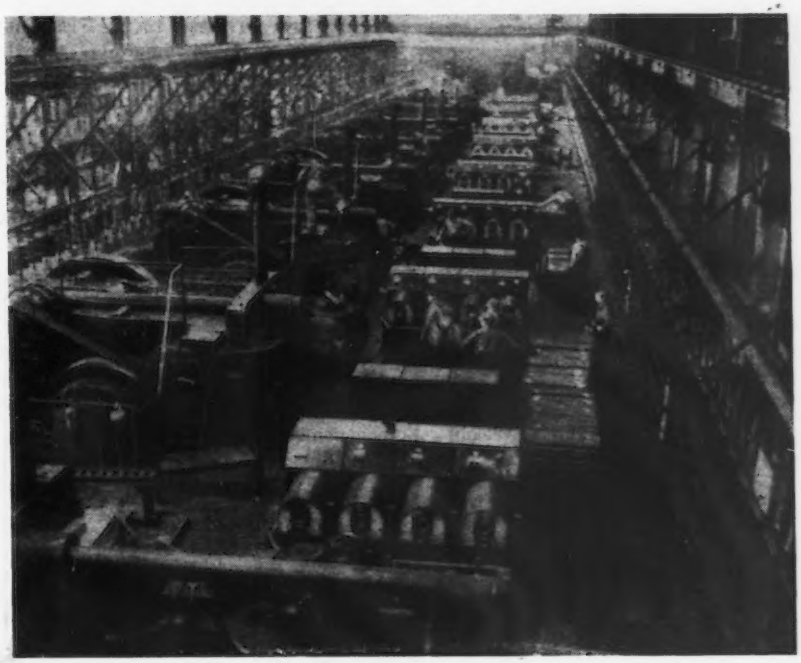
Strickland named eight principal advantages to the use of induction heating for forging. Induction heating's elimination of scale loss, which amounts to approximately 4 per cent in gas-fired furnaces, 6 per cent in oil-fired furnaces and 2 per cent in combination gas-oil fired furnaces, constitutes an important cost factor through reduced material cost and elimination of descaling. He pointed out that, with steel at 3c. per lb., a 3 per cent loss of material weight is worth nearly 1c. on a 10-lb. forging. Elimination of scale also provides an increase in die life of as much as 300 to 400 per cent.

Rapid heating to forging temperature is afforded because heat is conducted from the outside of the work, where it is generated, to its center, many times faster than the rate at which heat can be forced into the material from an external heat source, such as hot gases or the radiant walls of a combustion chamber.

"The bigger problem in rapid heating is to get heat into the bar rapidly rather than the problem of getting heat to flow from the outer metal of a bar or billet to the core," Striekland stated. "Typically, induction heating time for forging temperatures of 2300 deg. F. are 8 sec. for a 1⅜ in. diameter bar, 20 sec. for 1¾ in. diameter bar, 110 sec. for a 3 in. diameter bar and 7 min. for a 5¼ in. diameter bar. The length of the workpiece does not affect the rate at which it can be heated inasmuch as no heat flow is required axially."

Smaller space on the forging floor, approximating one-third of that required by fuel fired furnaces, and elimi-

POSSIBLY the world's largest induction heating installation is that of the 105 mm. shell plant at Mullins Mfg Co., Salem, Ohio. Each 700 kw. generator supplies power to seven tubular furnaces which heat bar stock in 4 min., providing the upsetters with a shell blank every 35 sec.



nation of the warm-up period are additional advantages. The latter is important in cutting labor and fuel costs incurred in waiting for conventional furnaces to warm up. He cited one forge shop which used 40 per cent of its 8 hr. oil supply in bringing its furnace to operating temperature. Ability of induction furnaces to reach heat immediately provides important flexibility in meeting such operational interruptions as die troubles and allowing immediate heating of one or two pieces of stock in setting up a job.

Ability to duplicate uniform or graduated temperature patterns with simple control also is important. It was noted that uniform bar temperature is not necessarily desirable in producing a given forging, tapered heat being preferable in gathering maximum stock on the end of a thin bar, and a graduated temperature pattern being required in the nosing of shell. Because temperature can be cut off quickly, leaving a narrow transition zone, induction heating often permits types of hot work which could not otherwise be done," Strickland declared. An example is the upsetting of the ends of tubing, either internally or externally, forming a substantially square shoulder without the use of complicated dies to provide the shape.

He cited examples of material savings through ability to forge to closer tolerances, thus reducing the amount of flash. At present, Budd allows only 1/16 to 3/32 in. for machining on all but the largest shell forgings, he declared. (See Table I)

Clean and cool working conditions increasing labor output were cited.

For most volume forge shop production, Strickland recommended motor generator type heaters on the basis of both first cost and operating efficiency.

### Frequency Factors

"For each frequency there is a minimum diameter of steel which can economically be heated to forging temperature," Strickland stated. "With 960 cycles it is uneconomic to heat bars smaller than 2¼ in. in diameter. With 3000 cycles it is uneconomic to heat bars less than 1¼ in. in diameter. With 9600 cycles it is uneconomic to heat bars less than 11/16 in. in diameter. When it is necessary to heat diameters smaller than 11/16 in., it becomes necessary to consider one of the oscillator types of power sources. When 20,000 cycle generators are under development, current costs are in the neighborhood of oscillator prices."

"From the above cost and size limitations, it would seem that to heat diameters larger than 2¼ in. in steel it would be most desirable to use a 960 cycle generator. However, the cost of power factor correction capacitors at 960 cycles per sec. is approximately double that at 3000 cycles. Therefore, the cost advantage, even for larger diameters in using 960 cycle generators, is not as marked as generator figures alone indicate. Heating current of 960 cycles will provide slightly more rapid heating of larger bars due to the fact that the current flow actually penetrates into the work about 70 per cent deeper than in the case of a 3000 cycle heating current. This advantage is offset, however, by the ability of 3000 cycles to heat a larger range of bar sizes, and if such a thing as a tentative standard may be suggested, it might seem that 3000 cycles would be the logical selection for that honor. The need for equipment to handle diameters which can only be handled by 9600 cycles and the occasional advantage of 960 cycles particularly in shops dealing in large diameters, has secured for them a place in the forging field. As a matter of fact, most heating equipment designs are arranged to use frequencies of 960 cycles to 9600 cycles with no change other than in the capacitors used."

### Non-Ferrous Materials

He acknowledged that efficiency of heating nonferrous materials was less than that of steel because of their higher conductivity, but noted that power requirements to reach a hot work temperature with common nonferrous metals are about the same or less than that required by steel. The lower forging temperature to which it is necessary to heat aluminum, for instance, offsets both a higher specific heat and lower electrical efficiency. The short heating time factor and reduced floor space required for equipment are other factors. Elimination of scale in heating of brass and copper and absence of de-zincification in the heating of brass provide arguments for induction heating in that field.

Strickland predicted the development of coil mounting devices to permit quicker interchangeability on short runs. He also noted that shops in which stock size was not too widely varied could employ a heating coil large enough to accept the biggest work piece without a prohibitive loss of efficiency on smaller sizes. Applicability of induction heating to sections which are non-uniform along their length was described even though a variable tubing wall thickness around its circumference is undesirable.

In weighing cost factors, it was stated that induction heating applied to forging bars 1¼ in. in diameter and larger currently requires an investment of approximately $17 for each pound heated per hour or at least $50,000 for complete generating and heating equipment for a 3000 lb. per hr. installation. An oil-fired furnace installation of similar capacity, including storage facilities, fuel handling, pre-heat equipment, piping, and accurate temperature control, in one instance, cost $16,525 or $5.50 per lb. per hr. This difference in first cost "can be and is, with properly installed induction heating equipment, offset by savings in operating cost," Strickland stated.

Large portion of the cost of induction heating is generating equipment, including motor starter and generator control, ranging on 960 to 3000 cycle machines from $50 to $55 per kw. In bar heaters the cost is said to be approximately $35 per kw. while continuous type of billet heaters may be as low as $22 per kw. One kw. of capacity will heat about 6 lb. of steel per hr., he stated.

Current cost generally is higher than fuel cost it was stated, 60 cycle motor power being drawn at a rate of 400 kw-hr. per ton, which with current at 1c. per kw-hr. equals $4 per ton to heat to a temperature of 2300 deg. F. Fuel fired furnace costs were reported as approximating 43.8 lb. per gal. of oil to a temperature of 2150

**TABLE I**

**Comparison of Typical Forging Weights Vs. Induction Heating Production Weights**

| Shell Size Mm. | Typical Forging Weight Lb. | Average Budd Induction Weight Lb. | Ratio |
|---|---|---|---|
| 60 | 3.33 | 2.39 | 0.72 |
| 81 | 6.88 | 6.00 | 0.87 |
| 90 | 30.00 | 24.40 | 0.81 |
| 105 | 40.50 | 33.87 | 0.83 |

deg. F. which, with oil at 5c. per gal., equals $2.30 per ton. Elimination of scale loss by induction heating, however, saves from $1 to $3 per ton, figuring steel at 2½c. per lb. and proportionately more with higher cost steels, it was cited. Cost of warm up oil provides an additional fuel cost. Savings outlined above were, in the sum, said to provide direct cost savings larger than scale savings.

### Induction Heating Growth

Frank T. Chesnut, secretary, Ajax Electrothermic Corp., Trenton, N. J., traced the growth of induction heating from 1916, when the high frequency furnace was invented. The first spark gap converter type furnace, principally for laboratory use, had cumbersome capacitors of glass plate and brass sheet, unreliable under the stress of high and erratic voltage. The spark gap had an alcohol dropper system to provide a hydrogen atmosphere. In 1920 large converter type furnaces were installed to melt 300 and 500 lb. charges of silver. These were powered with three-phase spark gap converters with a total rating of about 105 kva. The first vacuum tube converters to be used for induction heating were installed in the early 1920's. The first motor-generator equipment made its appearance about 1922, and commercial units were on the market in 1925. The earlier generators were of the salient pole or wound rotor type, and much more expensive and less efficient than present day equipment, although many still are in operation. Modern generators range to 1200 kw. or more in capacity, and reductions in bulk have made possible inclusion in capacitors of more than 300 kva. in 1/3 cu. ft. of space.

Among new melting applications, attention was called to a vacuum melting unit in which the mold remains stationary while the assembly as a whole is tilted. In a furnace adapted for pressure melting, the mold moves with the assembly as the metal is poured into it. Windows make it possible to view the operations within the shell.

The Army and Navy have purchased induction melting equipment for advance base work which is cubiclized and fully wired at the plant to promote ease of installation. A unit rated at 175 kw. will melt 650 lb. of steel in a little over an hour, or the same amount of brass in slightly under an hour.

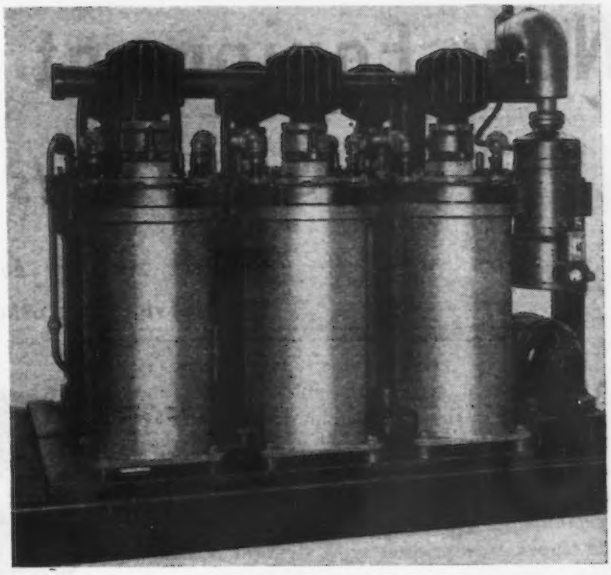
In discussing use of induction heating for forging, Chesnut discussed reasons for rejection of a proposal to heat billets to the recalescent point with cheap low frequency power, then carry them over to the forging stage with the more expensive high frequency power. High frequency alone proved cheaper than the combination.

Comparing heating for forging with heating for surface hardening, he pointed out that the same principle applies except that for surface hardening frequency and power are higher than for most forging operations. If the piece is to be forged, time must be allowed for heat to soak into the interior. For surface hardening, the heating cycle must be so rapid that the core does not become heated.

Development of a new mercury arc converter which fills out the low frequency range of electronic equipment used in induction heating applications was described by S. R. Durand, of the Allis-Chalmers Mfg. Co.

Designed for the purpose of electronically changing power at commercial frequencies of 60 or 25 cycles into 1000 to 2000 cycle power, the mercury arc type of frequency changer is suitable for supplying power for forging, melting, and metal treating applications where large masses of metal or metal parts must be efficiently heated with this power at capacities of 250, 500 and 1000 kw. and higher. Two successful applications of the new converters have been made in the past year, one being a 300 kw. unit in a forge plant, and the other a 250 kw. unit in use in the melting section of a brass foundry.

In months of operation, according to Durand, the mercury arc frequency changers have performed at higher full load and much higher partial load efficiencies than is possible with other types of converters for like frequencies; and operating and maintenance costs of mercury arc converters have proved to be much lower. The units are quiet in operation and require no ventilation or air-filtering, since they are water-cooled. In addition, high capacity mercury arc converters offer no vibration problems, making heavy and expensive foundations unnecessary.



AN Allis-Chalmers Excitron type mercury arc 60/1000 cycle frequency changer for induction heating applications.

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## *Brazing Low-Alloy Tool Tips With Powdered Alloys*

BECAUSE the quenching temperatures of low-alloy chromium-tungsten-molybdenum-vanadium tool steels range from 2147 deg. to 2264 deg. F., and are thus below the melting points of the materials generally used for brazing on tungsten high-speed steel tips, N. A. Minkevich, N. A. Bukhman and Yu. A. Geller investigated brazing alloys suitable for this purpose. Their results appeared in the Russian publication, *Vestnik Metallopromyshlennosti*, No. 8-9, pp. 45-57.

Brazing materials selected for tests were two copper-nickel alloys and 75 per cent ferromanganese, the melting point of which having been controlled between 2012 deg. and 2336 deg. F. by additions of up to 40 per cent copper. Both furnace brazing and electrical resistance brazing were employed. Shear tests and heat-treatment and cutting tests were made on the brazed-on tips.

Best results were obtained from a ferromanganese brazing alloy containing 20 to 25 per cent copper. Although the copper-nickel alloys gave a higher shear strength, their behavior during subsequent heat treatment of the tools was found unsatisfactory. Attempts to quench tools directly from the brazing temperature resulted in reduced cutting efficiency.

# New Equipment . . .

## Small Tools

***. . . Recent developments in cutters, holding fixtures, fastening devices and other small tools are described in the following pages.***

AN extension of its line of Armstrong carbide tool holders and Armide-carbide tipped cutters has been announced by *Armstrong Bros. Tool Co.*, Chicago. The tool holders especially designed for use with carbide tipped cutters come with straight right hand offset or left hand offset shanks, each in seven sizes. Armide Cutters come tipped with carbides of two grades, Armide Red for machining steel and Armide Gray for machining cast iron, brass, bronze, aluminum and non-metallics. All sizes of Armide cutters come ground to four standard cutter shapes and in two weights, standard or heavy duty.

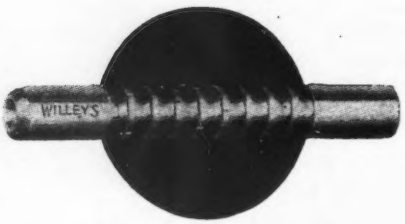
### Variable Contour Cutter

AN application of the Turchan hydraulic follower machine in which a lathe can be used to machine curved surfaces of variable contours

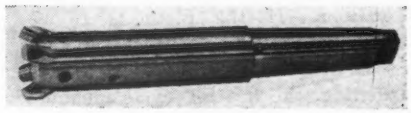
has been announced by *Turchan Follower Machine Co.*, 8259 Livernois, Detroit 4. Using a master pattern or template as a guide, the attachment follows the contour so exactly that the housing is finished to a tolerance of 0.001 in. on both the inside and outside diameters. A complete cut every 15 min. is accomplished on a piece approximately 17 in. in diameter, with three different radii and tapers.

### Tungsten Carbide Broaches

SOLID tungsten carbide broaches made in diameters of from 0.250 to 1 in. and moderate lengths have




been announced by *Willey's Carbide Tool Co.*, 1340 W. Vernor Highway, Detroit 1.



### Four-Cutter Tool

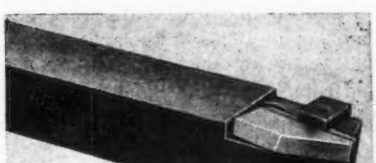
FOUR-CUTTER tools used for hogging, counterboring, finish drilling and reaming have been announced by *State Mfg. & Construction Co.*, Franklin, Ohio. The tools are inserted at a 30-deg. angle, the inner end of each bit impinging upon a finely threaded screw so that the bit can be protruded for regrinding or for machining a hole of larger diameter. Built in standard sizes with fluted or plain bodies, the tools range in cutting diameters from ¾ to 4¾ in. The clusters of bits can be expanded in circumference ⅛ in. in the smallest model to 1¼ in. in the largest for increasing the cutting diameters.

### Form Cutting Tools

A LINE of cutting tools, form ground with cam relief, has been announced by *Gay-Lee Co.*, 117 East Hazelhurst, Ferndale 20, Mich. Featured in the line are standard gear tooth pointers and special tools ranging in size from 1½ in. in diameter down to the exceedingly small special reamer, illustrated.

### Clamped-On Carbide Tools

A LINE of carbide tools having clamped-on and advanceable tips for heavy duty machining of steel castings, forgings and bar stock and cast iron has been announced by *Kennametal Inc.*, Latrobe, Pa. The Kennametal tips overhang the tool shank by about 1/16 in. and have ample strength to take heavy feeds and depths of cut. The special type of tip used has a clamping shelf along the top of the side opposite the cutting edge. It is diamond ground on the underside. When dull, the tip is ad-

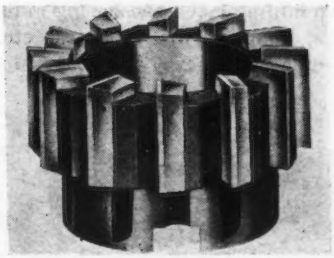


vanced to the front and side in the oblique recess until the major part of it has been utilized.

### Cast Non-Ferrous Tools

AN improved cutting tool made of a cast nonferrous alloy consisting principally of chromium, tungsten and cobalt has been developed by *Jessop Steel Co.*, Washington, Pa. Its hardness range is from 60 to 62 Rockwell C. and it bridges the gap between high speed steel and cemented carbide cutting tools. Cast to shape and used in the as-cast condition, the tool has exceptionally high red hardness. Only one point drop in Rockwell C is noted at temperatures ranging as high as 1900 deg. F. Because of the toughness of the tool, intermittent cutting even of chilled castings is possible. The tool cannot be hot worked and is not susceptible to heat treatment. Both flats and squares for tool holder bits or for milling cutter inserts, surface ground to tolerances of

0.000 and —0.005 are available. Round sections will be centerless ground to the same tolerances. Die inserts or other complicated sections are furnished in the as-cast condition.



### Shell End Mills

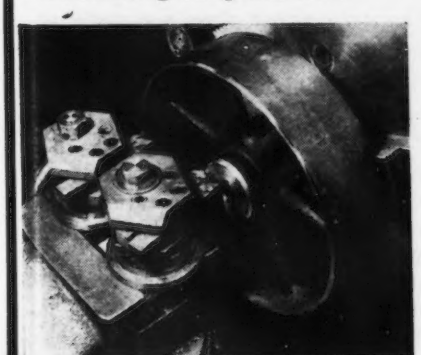
SMALL standard shell end mills with brazed in blades made of Haynes Stellite cobalt-chromium-tungsten alloy have been announced by *Haynes Stellite Co., Unit of Union Carbide and Carbon Corp.*, Kokomo, Ind. The cutters are furnished with blades of either Haynes Stellite 98M2 or Star J-Metal brazed into a steel body. Diameters range from 1¼ to 6 in. with face thicknesses from 1 to 2¼ in.

### Coated Abrasives

AN improvement in coated abrasives, called Durabond, a treatment which hardens the adhesive and makes it more resistant to heat and less sensitive to humidity has been announced by *Behr-Manning Corp.*, Troy, N. Y. Durabonded products are said to show an average of 20 per cent longer life on fast running belts, fibre combinations and cloth "gadgets."

### Carbide Tool Holder

A HOLDER for carbide tools has been announced by *Howard Mfg. Co.*, 3370 West 140th Street, Cleveland 11. It can be used with one or two tools or in combinations having four tools in two holders. The holder is adjustable for height, eliminates chatter and remains rigid at all times. There are no blocks or shims to adjust when resetting sharpened tools.



### Metal Disintegrator

FOR removing broken tools embedded in dies and work pieces, the Drafto metal disintegrator has been announced by *Drafto Corp.*, Cochranton, Pa. The disintegrator is completely self-contained and operates on any 110 volt, 60 cycle power source. It will disintegrate any metal

by means of a vibrating arc centering directly over the embedded material. A special coolant assists disintegration, helps to cool electrodes and prevents heat distortion. There is said to be no possibility of damage to delicate contours of dies or work pieces.

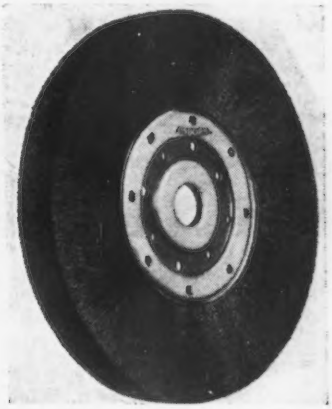
### Vitrified Bonded Diamond Wheel

A VITRIFIED bonded diamond wheel has been developed by *Norton Co.*, Worcester, Mass. The out-

standing feature of the wheel and also a vitrified bonded diamond hand hone is said to be the combination of fast cutting action with extremely long life. The wheel is said to grind shank steel with little tendency to glaze or load. Norton vitrified bonded diamond hand hones and 4 and 6 in. diameter chip breaker wheels are available.

### Power Brush

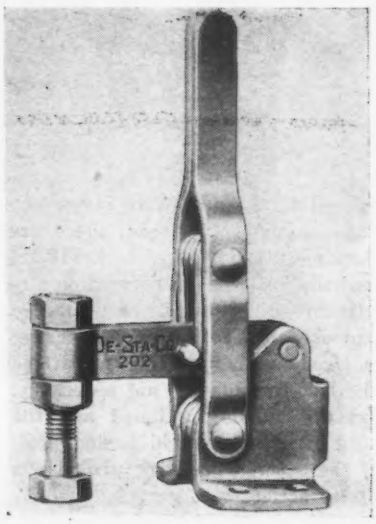
A POWER brush for removing burrs, preparing metal surfaces and for work on rubber parts and many other applications has been announced



by *Osborn Mfg. Co.*, 5401 Hamilton Avenue, Cleveland. Called the Osborn Monitor brush No. 1409-S-22, it is a 12 in. monitor section filled with 0.005 in. Osborn power brush wire and has a 1¼ in. arbor hole. It is said to be particularly suited to aluminum, brass and other ductile metals for removing burrs without damaging adjacent surfaces of the part.

### Toggle Action Clamp

AN all-aluminum toggle action clamp has been announced by *Detroit Stamping Co.*, 345 Midland Avenue, Detroit 3. The clamp known as the De-Sta-Co Model 202-A is made of pressed aluminum parts and weighs less than 3 oz. including steel hold-down spindle and adjustment nuts. It measures 2½ in. long, 1⅝ in. wide at the base and 3¾ in. high when in locked position.



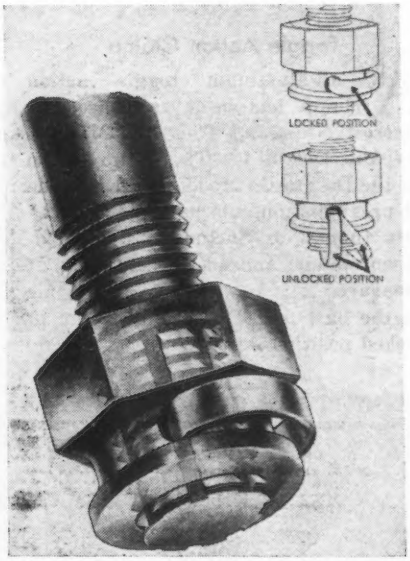
### Vise Wrench

AN improved vise-wrench has been announced by *Knu-Vise, Inc.*, Detroit 16. Made of alloy steel forgings, properly heat treated, the milled teeth welded to the stamped body (also heat treated) are said to possess added wear resistance. The tool can be used as a portable vise to hold work for such operations as drilling,

welding, riveting, soldering, grinding, etc., or as a pipe wrench. Vise wrenches are available in two sizes: Model VG-10 in 10 in. length, weighing 18 oz., and VG-7 in 7 in. length, weighing 13 oz.

### Safety Nut

OPERATING on the principle of the engagement of a snap ring in one of a number of longitudinal serrations in the bolt thread, a dual purpose safety nut has been announced by *Simmons Machine Tool*




*Corp.*, Albany, N. Y. With seven serrations on the bolt thread, there are 14 locking positions for each revolution of the nut. It can be used on any length thread and can be easily locked or unlocked by the flip of the locking ring. Used as a stop nut the serrations in the bolt threads are not necessary. When the nut is tightened and the locking ring snapped in locked position, the spring pressure provides a stopping action.

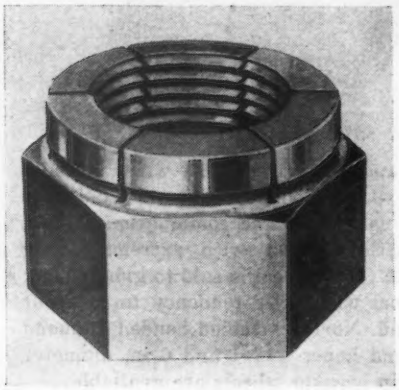
### Demagnetizer

FOR demagnetizing magnetically soft materials, such as common irons and steels, and partly demag-

netizing permanent magnets such as alnico, a line of demagnetizers has been announced by *General Electric Co.*, Schenectady, N. Y. Designed to demagnetize tools, drills and punches in order to prevent excessive tear and wear caused by the adherence of magnetic chips, they also demagnetize various machined parts, thus releasing fine adhering particles which often cause severe wear. In addition they can be used to adjust and stabilize the magnetic flux in permanent flux assemblies for such applications as electric instruments and control devices.

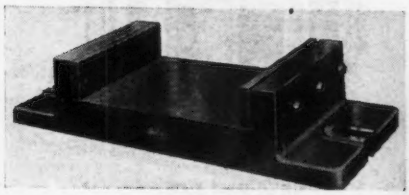
### Stop and Lock Nut

A STOP and lock nut, the Flexloc, has been announced by *Standard Pressed Steel Co.*, Jenkintown, Pa. The nut is made in one solid piece from top to face and therefore every one of the locking threads carries its share of the load. The top of the nut has six radial slots, illustrated, providing an equal number of sections which do the actual locking.



### Holding Fixtures

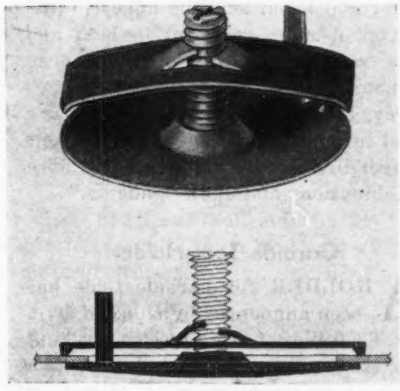
A HOLDING fixture designed to cut down the set-up and loading time on milling machines, boring mills, planers, shapers, drill presses, etc., has been announced by *Challenge Ma-*



*chinery Co.*, Grand Haven, Mich. The fixture is available in three standard sizes.

### Speed Nut Cover Plate

SPEED NUT cover plates have been announced by *Tinnerman Products, Inc.*, 2040 Fulton Road, Cleveland 13. The nuts are easily and quickly attached from one side by sliding one end of the Speed Nut into the hole, centering the cover plate over the hole and tightening the screw. The turned-down tab on the cover plate prevents the nut from turning while the screw is tightened.



To remove, the screw is loosened and the Speed Nut slipped out of the hole. Three sizes are available to fit a wide range of panel thicknesses and to cover holes 29/32, 1⅛ and 1⅜ in. in diameter. Other sizes are made on special order.

### Self-Locking Nut

A SELF-LOCKING nut has been developed by *Dzus Fastener Co., Inc.*, Babylon, N. Y. It is said to withstand high heat temperatures, oil, or any other disturbing element that might affect proper functioning. It maintains its locking features regardless of the number of times it is screwed on and off.

# Time saved...

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The manufacturer of these collet holders reports "a time saving of eighty percent (80%) over the method formerly used - - - ", when a Jones & Lamson Pedestal Optical Comparator was installed. The angles are held to limits of ± 15 minutes of arc, and the straight diameter to ± .001".

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# Assembly Line . . .

STANLEY H. BRAMS

**• Start of manufacture of taxies is being urged to meet transportation needs in larger cities . . . Effective taxi fleet is about half of normal, and maintenance needs are heavy.**

DETROIT—Manufacture of taxicabs is a specialty business, and a big one. In normal times probably somewhere between 50,000 and 75,000 taxicabs are built annually, each worth between $1,100 and $1,500 —a stake of $80 million or so. Today there is likely a waiting market close to 150,000 cabs waiting for a resumption of automotive production —a total which would replace nearly every cab in service before the war.

The Office of Defense Transportation recognizes that taxicabs fill a transportation need many times that of private automobiles, and in the main it has now been too severe in its limitations on travel. In the same breath, ODT has been extremely interested in maintenance of a sufficient cab fleet on the streets as an alternative to further crowding of transit vehicles in some instances or overuse of private cars in others.

As a result, ODT probably will lend some support to a proposal which has been newly submitted to the War Production Board calling for the building of an unspecified, but substantial, number of taxicabs. Their manufacture would take place this year, and would probably amount to several tens of thousands. The likelihood is that some sort of permission to build such vehicles may be forthcoming during 1945 regardless of the fate of other automotive production, due to the specialized yet broad sphere of service filled by the cabs. A further compelling reason for manufacture lies in the fact that repair costs for taxicabs are larger today per year than the cost of complete new vehicles. In other words, replacement parts are probably going into taxicabs in nearly the same volume as duplicates would go into new vehicles.

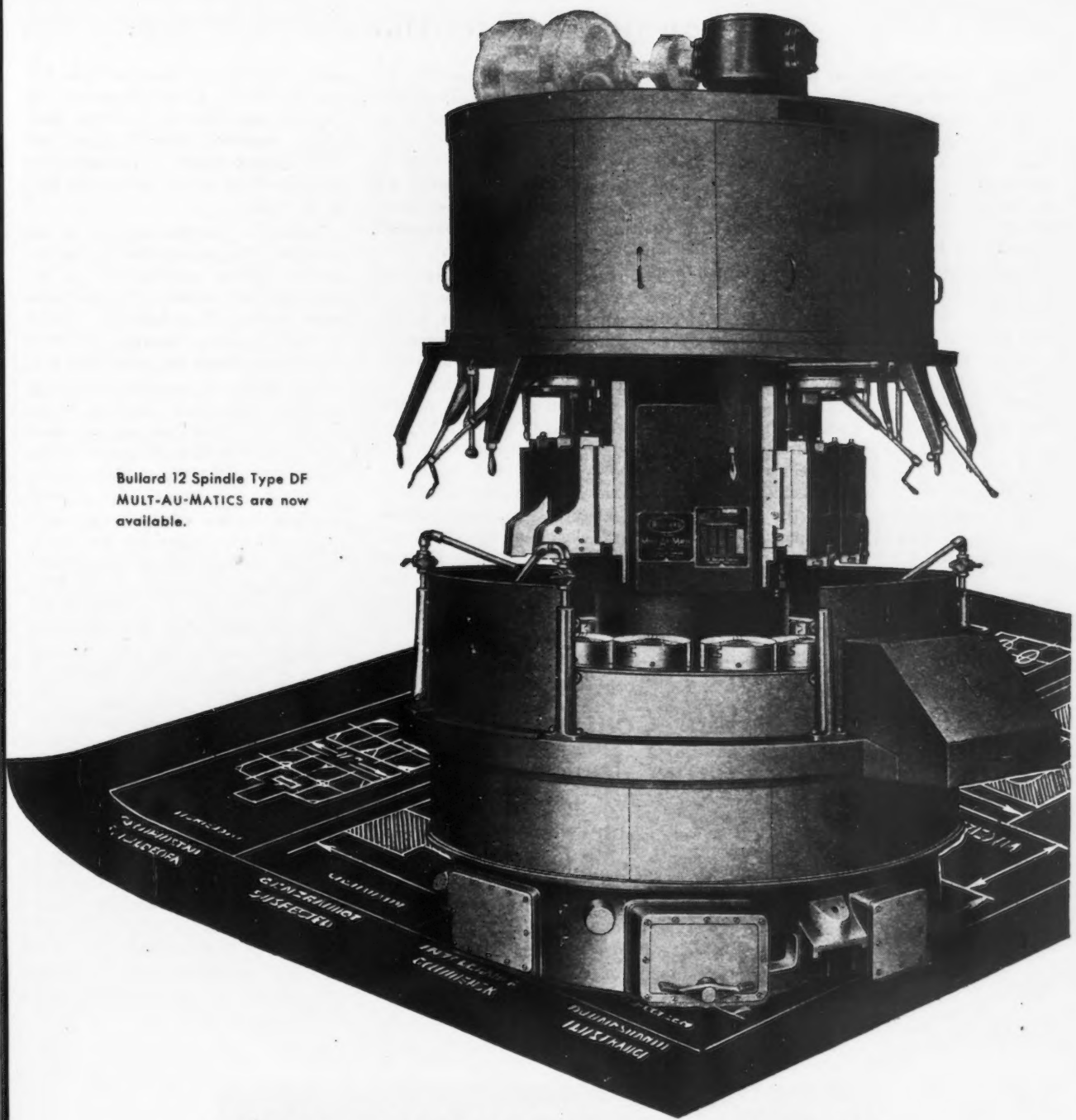
The fact of the matter is that taxicabs, a definitely needed form of transportation, are largely on their last legs. Statistics on file with WPB and others procured from private sources indicate a situation which needs some correcting.

For example, of the approximately 150,000 cabs in service in 1941, probably no more than 100,000 survive today—a leveling considerably greater than has occurred in privately owned passenger cars. But that picture is quite incomplete, because no day goes by when more than 75,000 cabs or so can be put on the streets. At least a quarter of the taxies in service are on repair lines every day.

There is only one specialized taxicab maker, that being Checker Cab Mfg. Co., of Kalamazoo, Mich., which functions in the operating field as well as manufacturing. Checker produces what it maintains is the only real taxi—special body, heavier frame, heavier brakes, larger generator and battery, heavier clutch, harder springs which last longer but do not provide as good a ride, and other attributes which give the vehicle special adaptability for rough-and-ready, stop-and-start city driving. But a considerable share of outstanding business is customarily done by such vehicle makers as Ford and Chevrolet, Plymouth and De Soto, whose products are specified somewhat heavier in some particulars and often provide special body arrangements, but which do not represent a distinct variation from standard passenger car types.

CHECKER CAB can start production in a period of several months if WPB permits a go-ahead. Its management is figuring into that time-span not only the difficulties of clearing its own plant, but also of obtaining the stream of parts and components needed for an operation such as it maintains, largely on as-

UNDER FIRE: *An American LST, part of the huge invasion force which moved into Luzon Island in the Philippines, unloads its cargo of equipment while under Japanese artillery fire.*



Bullard 12 Spindle Type DF MULT-AU-MATICS are now available.

# BULLARD MULT-AU-MATIC . . . TYPE DF

## Twin Tooling Doubles Production With Investment Up Only Slightly

On work up to 8″ in diameter and 10½″ in height, you can now produce two finished pieces in the time of the longest single boring, turning, facing, threading, grooving or drilling operation plus a few seconds for indexing.

Twin spindles at each of the six or eight stations and twin tooling on the head of each working station mean that you double the ordinary MULT-AU-MATIC production output for its size of work.

That's lowering unit production costs in earnest . . . a *must* if free enterprise is to increase buying power and preserve full employment.

For full details about Bullard Twin 6 and Twin 8 Type DF MULT-AU-MATICS, write today for Bulletin DF1.

The Bullard Company, Bridgeport 2, Connecticut.

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sembly. Checker Cab may be the only major authorized producer of cabs at the start, if WPB is so inclined.

This company, however, may undertake subcontracting of a principal share of its operations should such authorization come through. Talked of in this respect is Packard Motor Car Co., in which taxi operators are interested because of the impressively low maintenance costs which Packard cabs have registered in New York before and during the war years.

New York is the largest market for taxicabs. Some 11,000 vehicles are licensed there. Under tacit agreement with the ODT, about a third of these have suspended operations during the war as a gasoline and tire conservation measure; this was possible because approximately half of the fleet is owned by National Transportation Co., a subsidiary of Parmalee Transportation Co., which could be dealt with as an entity. Individual arrangements were made with smaller and with private operators to achieve similar conservation. Chicago, with about 3500 cabs—3000 belonging to Yellow Cab Co., and 500 to Checker Cab Co. —has not seen any cabs leave the streets, but does achieve conservation by limiting mileage to approximately 90 miles per day.

These conservation measures and others have reduced the amount of driving done by cabs, but it is still considerable. In Chicago, as example, vehicles travel around 2700 miles per month; in New York it is more. By contrast, peacetime saw cabs moving somewhere around 4000 miles per month, which gave them an effective life of four years or so in metropolitan cities, after which they were often sold to operators in small towns, where they eked out another 50,000 miles or so in two or three years of added operation before being consigned to the junkheap.

## $604,000,000 in War Contracts Flood into Detroit during January

*Detroit*

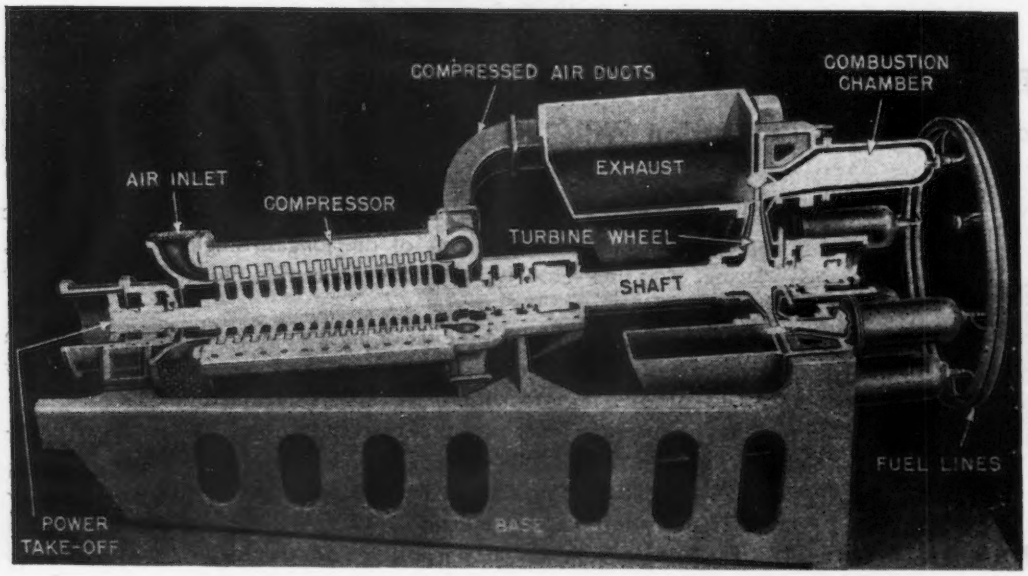
• • • **New and amplified war contracts totaling $604 million were placed in Detroit during January, signalizing the services' intention to have plenty of materiel to meet any European needs and to fight the war with Japan simultaneously and afterwards. Of these, $511,000,000 in contracts were placed on the last day of the month.**

**The January placements were somewhat more than 20 per cent of total ordering during all of 1944, and are being followed by similarly large commitments being arranged this month. As a result, district steel offices have been overwhelmed by new ordering which has booked them far into 1945 and, in some special instances, into January and February of 1946. Some offices reported that January was their biggest month of business since the first flood of orders at the start of the war.**

**Employment requirements in the factories were raised 4000 by the new orders. Added employment in construction was indicated by the placement of about $50,000,000 in construction and facilities commitments, which are separate from the other contracts.**

**Ford Motor Co. received the greatest share of the new ordering. It was awarded a $298,844,000 assignment to manufacture B-24-N bombers at Willow Run, the WPB announcement being the first disclosure that the "N" type was the new single fin ship which has been under extensive test in recent months and which supplements or supplants the twin tailed B-24. Ford also was given a second series of orders amounting to $130,000,000, covering manufacture of 2800-hp. Pratt & Whitney aircraft engines at its Rouge works.**

**The greater share of the facilities contracts provided for expansion of tank manufacturing, indicating a new turn in military thinking. The Detroit Tank Arsenal, operated by Chrysler Corp., was allotted $15,000,000 for additions. Ford's tank facilities will be increased by $4,700,000. Cadillac's plants for manufacture of light tanks will be expanded by $12,000,000. The bulk of the other contracts covered amplified ammunition requirements, including heavy guns, rockets, shells and similar needs.**




o o o

**GAS TURBINE:** *Proposed for marine installation is this standard gas turbine type, prepared in model form by General Electric. According to an announcement by the Maritime Commission, contract has been let for construction of a gas turbine powered vessel.*

o o o

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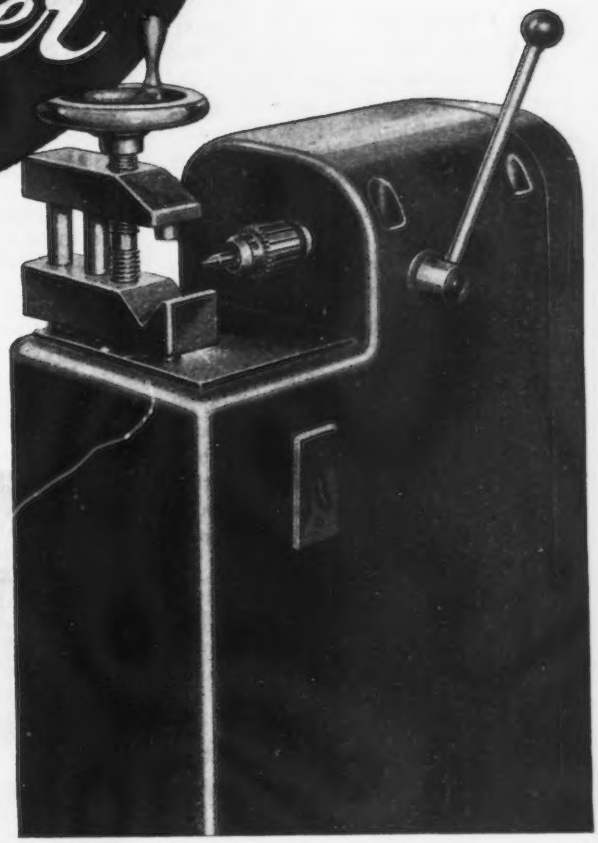
## *Quickcenter*



THIS machine is a speedy, easy and accurate performer. It's so easy to use that any workman can handle it. You simply insert one end in the Vee-Block, tighten the hand wheel and advance the center drill—then reverse the bar and center the other end. The **Quickcenter** will do in less than a minute a job that may take over half an hour on a lathe — and do it far more easily and more accurately. The **Quickcenter,** small and compact, increases shop output, uses unskilled operators, saves time and material—and increases your profit.

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**DETROIT 26, MICH.**

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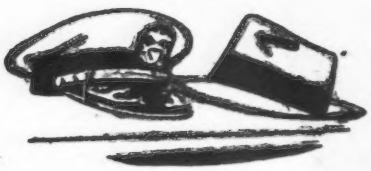
# MURCHEY

# Washington . . . L. W. MOFFETT

**• War Department steel requirements to reach all time high in second quarter . . . Demand will be in excess of 4,500,000 tons . . . Essential needs may be hard hit.**



WASHINGTON—War Department steel requirements will reach an all time high for the second quarter with a demand in excess of 4,500,000 tons. If WPB grants a substantial portion of this increase of 750,000 tons over the first quarter, then not only will small beginnings of non-essential civilian production be obliterated, but many essential things for the economy will have to be hard hit.

Third and fourth quarter steel demand will be still higher, WPB Chairman J. A. Krug said on Jan. 30. Mr. Krug commented that while military procurement will only be about $1,000,000,000 higher this year than last year, steel demand will be much higher because the items now needed use much more steel.

Increased steel demand will be reflected in boosts in the following programs: Ammunition, landing mats, aircraft, light-heavy trucks, tanks, heavy artillery, drum stock and bombs and rockets.

Although it has not been possible to get anyone in government to say it, indications are that lend-lease and other export steel will not be cut to satisfy increased military demand. However, sufficient figures have not been submitted to WPB to afford a complete picture of the impact of the programs.

* * *

**When is VE-Day** may seem a screwy question, but it has had to be decided. Organized resistance in Germany will probably cease long before the Army declares that VE-Day has arrived. And that is VE-Day, when the War Department says so. That will be after the Germans have been completely defeated, when no guerrilla warfare goes on.

* * *

**CMP may turn out to be** like the melody that lingered on, and the implications of this fact are that other controls may have to be retained by WPB and the manpower authorities after VE-Day. Mr. Krug told THE IRON AGE that reconstruction demands and a need for maintaining high level war production during the war with Japan, will prevent the sacking of CMP as soon as it was planned according to thinking last October.

* * *

**Probably exaggerated is** the feeling among many old time WPB officials that WPB is being run by the Byrnes office, with military requests being filled automatically without respect to supplies of materials and components needed for essential civilian production.

These men feel that Mr. Krug would do a great many things differently if he had a freer hand. They say Mr. Krug is a good soldier and follows orders.

On the other hand, there are those officials in WPB who think Mr. Krug is doing a very level-headed job of managing WPB and if he accedes to military wishes, it is because the Army has correctly stated its needs in his opinion.

Other shades of opinion range from criticism of Mr. Krug as a department head who dislikes administrative detail and consequently has let a lack of program planning cause a mounting tidal wave of confusion in industry comparable to the early days in 1941, to absolute denial that such a situation is building.

It is recalled that similar criticisms were launched against Presidential Assistant Donald M. Nelson when he held the top WPB job and perhaps the rumblings go along with the job of being head of WPB.

* * *

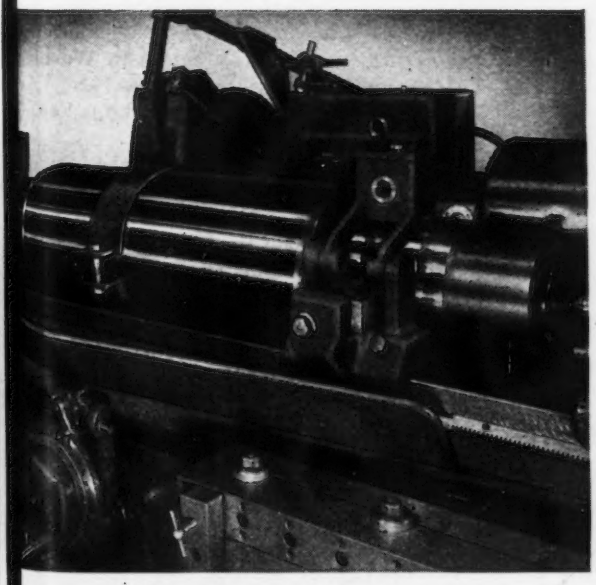
**It is hard to believe** that Mr. Krug is unaware of the criticisms being voiced within his organization. This criticism is serious and probably unjustified.

It should be remembered that with procurement setup as it is within the

CAPTURED ROCKET GUN: *Two American soldiers examine some of the features of an abandoned German Minenwerfer in northern France. Though the U. S. is a newcomer to rocket warfare, Yank scientists are making mighty strides in its development. The Eastern Front has long seen exchanges of rocket artillery fire between Russian and German weapons of types similar to this.*

# EY'RE OLD HANDS

## *grinding these fussy jobs!*



Close-up of CINCINNATI 16" x 72" Plain Self-Contained Grinder with swivel table roll crowning equipment. These machines are available in 14" and 16" sizes; between center lengths up to 168". Write for catalog G-491-1 for complete specifications.

Here's one place where they both have to be good—the machine and the operator. In this case the machine is a CINCINNATI 16" x 72" Plain Self-Contained Grinder with swivel table type roll crowning equipment, and the operator is finish grinding a crowned roll used for rolling aluminum foil. This operation requires the ultimate in accuracy and finish because aluminum foil must be produced without wrinkles or blemishes. The ends of the roll must be the same diameter within .0001", and finished within 4 micro inches. Any rolling mill operator will tell you what a fussy job this is and that a machine capable of doing this class of work *has to be good.*

Perhaps you have unusually accurate grinding operations where CINCINNATI Grinding Machines, with their exclusive Filmatic bearings, could be used to advantage. Our engineers will be glad to discuss it with you.

**CINCINNATI GRINDERS INCORPORATED** CINCINNATI, 9 OHIO, U.S.A.

armed services, Mr. Krug does not have the authority to question strategic decisions on the quantity or quality of goods ordered by the military as it is understood Sir Andrew Duncan, British Minister of Supply frequently has. There is no civilian control of procurement, and consequently Mr. Krug's field of authority is necessarily limited to advisory functions in these respects. He can only question the amount of material necessary to accomplish the ends sought by the military, can umpire and straighten out conflicting claims, and try to secure the proper amount of production facilities necessary to successfully conduct the war.

Only now is WPB getting a little of the authority over manpower back from WMC. With the approval of War Mobilizer Byrnes, Area Production Urgency Committees (interagency field groups headed by a WPB representative) are going to receive advance notice of the armed service's intention to put a contract in excess of $100,000 into a Group 1 labor area. If the APUC decides that the area cannot handle the contract with the manpower available, it suggests that the contract be awarded elsewhere where labor supply and open capacity are available to a greater degree. This is in a sense some sort of control over procurement too, but since other agencies such as the Army and Navy and Maritime Commission vote in the APUC it cannot be said that WPB exercises the authority alone. If the Army and Navy say haste of military precludes advance notice, then the APUC is powerless to act.

Too, the President has permitted Mr. Byrnes to layer-in above Mr. Krug, Maj. Gen. Lucius D. Clay in a policy post with the responsibility for war production. This has made some confusion, it is understood, although General Clay did a very creditable job in behalf of the Army Service Forces as director of materiel.

If the war production situation is getting confused because of lack of planning and too many cooks, the fault must lie in the echelons of authority above Mr. Krug and he should not be too greatly blamed for doing his job the way his superiors require him to.

## *Latest Order Bars Deficiency Makeup On Class B Products*

*Washington*

• • • Adopted to prevent "jamming" of production into shorter periods than intended, WPB has ruled that manufacturers who are behind schedule in making Class B products under CMP procedures may not make up such deficiencies in any but the succeeding quarter for which such production has been authorized, and then only up to 10 per cent of the total production that has been authorized. This rule was set forth in an amendment to CMP Regulation No. 1. Formerly any production lag in Class B products could be made up in any succeeding quarter or quarters. This rule still applies to Class A products. Roughly Class B includes most civilian products and Class A military products.

The amendment also permits the use of controlled materials that are not needed for the production schedule for which they were originally acquired on any other production in the same plant.

## Mines to Work Sundays

*Washington*

• • • Declaring that the coal supplies at some of the steel plants are dangerously low, and unless additional coal production is obtained immediately serious disruption of steel output may occur, Solid Fuels Administrator Ickes announced on Tuesday that negotiations have been taken up with eight steel and coke companies in the Pittsburgh-Youngstown area aimed at operating some of their western Pennsylvania captive mines on two Sundays this month. Miners employed at 21 Captive River mines in Washington and Fayette counties, Mr. Ickes said, have agreed to work on Feb. 18 and 25.

The agreement for the Sunday work was effected by John L. Lewis, president of the United Mine Workers. Double time as provided for in the labor industry contract for work on the seventh consecutive day will be paid by the producers who agree to operate their mines, the administrator said.

## Yocum to Go to China

*Pittsburgh*

• • • G. M. Yocum, assistant to the general manager of metallurgy, Wheeling Steel Corp., will leave for China about Feb. 14, for a few months. He will work at speeding up Chinese production of bessemer steel and aid in the improvision of methods for dephosphorizing bessemer steel from about 0.250 to about 0.100 per cent phos.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

WHAT DO I KNOW ABOUT TH' MACHINIST TRADE? WHY, NOTHING--BUT I HAVE MY GRAN'PA'S TOOLS AND BOOKS ON SHOP PRACTICE, AND IF I DON'T KNOW A THING I'LL JUST MERELY LOOK IT UP LIKE A LAWYER OR DOCTOR DOES!
I DON'T BLAME THE OL' MAN FER LOOKIN' TIRED-- WHAT THIS KID'S GRAN'PAW USED WON'T HARDLY FIT IN WITH THIS DAY AN' AGE!
WELL, YOU CAN PRACTICE ON PATIENTS AN' CLIENTS, BUT YOU CAN'T PRACTICE MUCH IN A SHOP WITHOUT HURTIN' TH' WAR EFFORT!
THE YOUNG COMER
T. M. REG. U. S. PAT. OFF. COPR. 1945 BY NEA-SERVICE, INC.
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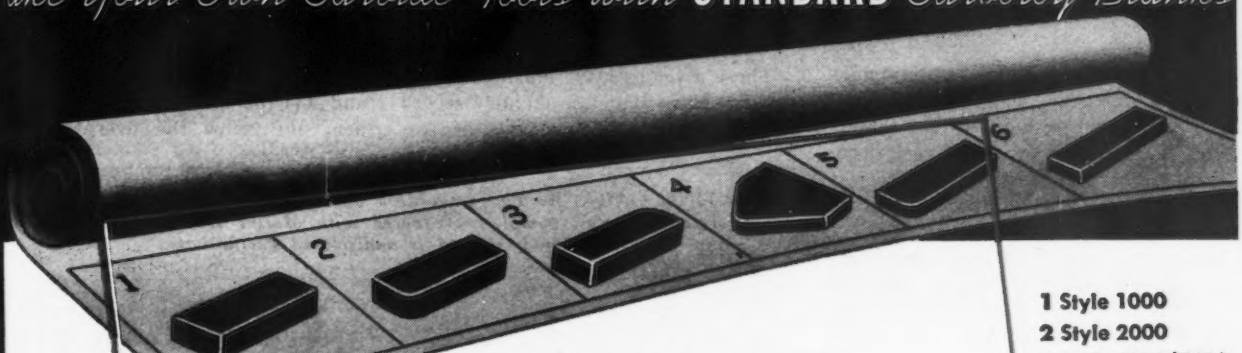
WHEN

"the Heat's On"

Make Your Own Carbide Tools with STANDARD Carboloy Blanks




1 Style 1000
2 Style 2000
3 Style 3000 (R.H.)
Style 4000 (L.H.)
(Clearance Formed)
4 V-Series Blank
5 Reamer Blank
6 Scraper Blank

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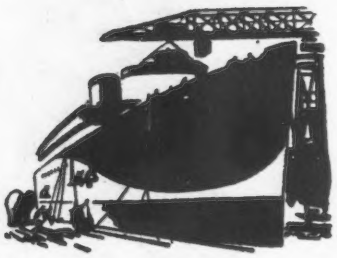
# West Coast . . .

OSGOOD MURDOCK

**• Summary of wartime ship production on Pacific Coast reflects remarkable volume and economy in manhours . . . President E. E. Wilson proposes that Army scrap one-quarter its post-war plans annually.**



SAN FRANCISCO — Summary figures for the Pacific Coast shipbuilding industry for the entire period and a sober, well-documented, careful analysis of postwar prospects and probabilities was issued last week by the Federal Reserve Bank of San Francisco whose research and statistical department has careful analysts and experienced, accurate and practical industrial statisticians.

Although not a single ocean-going merchant vessel over 2000 gross tons had been built on the west coast during the decade and a half ending in 1938, 200 merchant vessels were delivered by the end of 1944. On Jan. 1, 1945, there was a backlog of around 460 vessels under construction and new contracts were placed by the Maritime Commission for 82 additional so that nine of the 12 large Pacific Coast yards building for the Maritime Commission are set for new construction through the year 1945. The remaining three yards, all on San Francisco bay are changing over to repair work, and more outfitting docks, drydocks and general repair facilities are being installed.

In 1940 two Navy yards on the west coast employed 25,500 workers and all the private yards at all the ports employed only 19,000. At the end of 1943 five Navy yards employed 79,500, an increase of more than three-fold, and the private yards, grown in number, had a total working force of 525,000, over a 27-fold increase. At the close of 1944 the Navy yards were employing 95,000, a substantial increase over the previous year while the private yards working force had declined to 441,000, a release of 84,000 workers.

Over the six-year period 1939-1944 the building programs of the Maritime Commission on the Pacific Coast have involved a total outlay in excess of $4,000,000,000. Approximately $239,000,000 of public funds have been invested in shipbuilding facilities, principally in the eight great new fabrication, assembly, erection and outfitting plants that have risen to furious activity from the tidelands on Terminal Island, Los Angeles Harbor, on the east and north shores of San Francisco Bay and on the Willamette and Columbia rivers in Oregon and Washington.

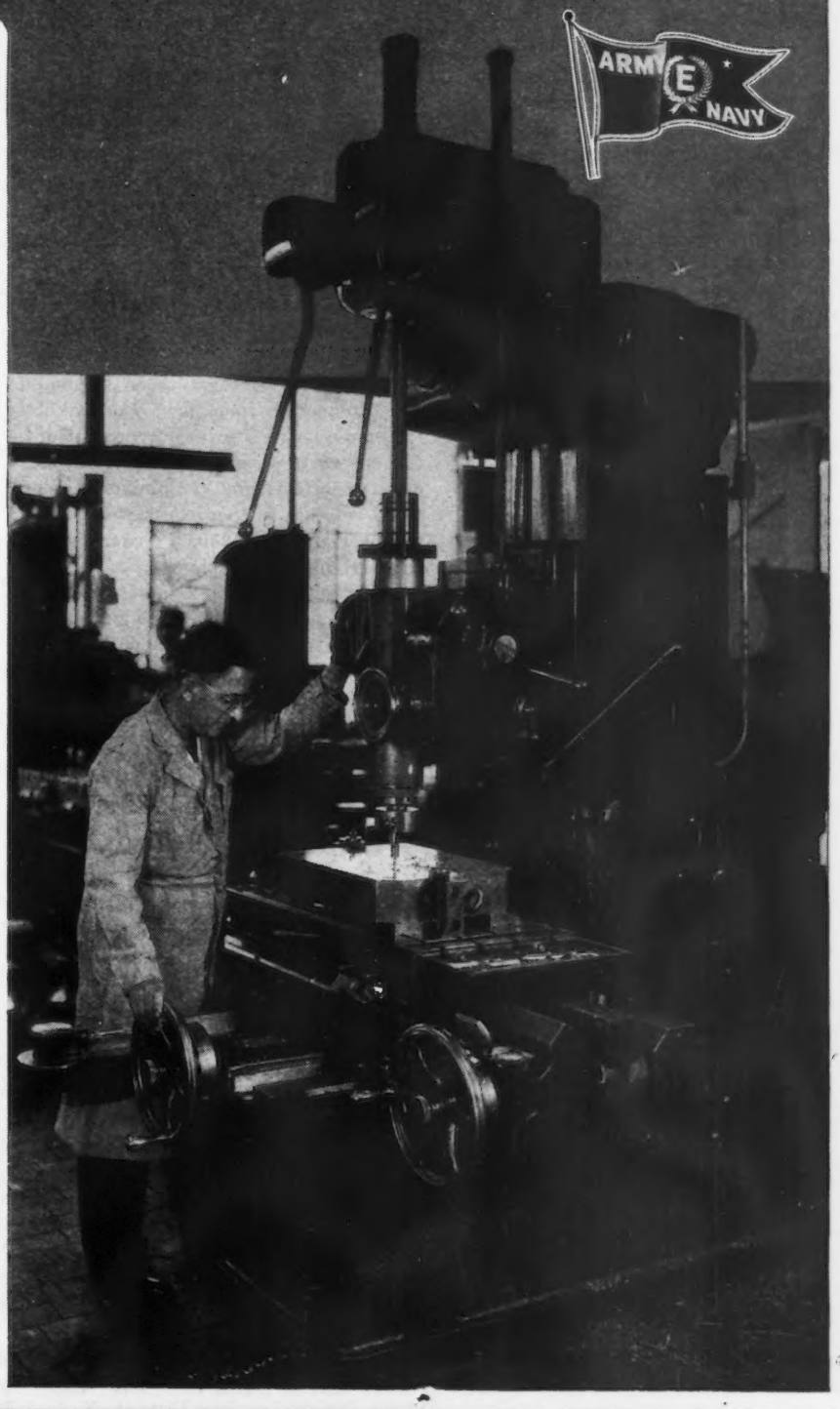
These Pacific Coast maritime shipbuilders have made an enviable record both for speed and economy, according to official records. For the 22[illegible] Liberty ships delivered by all United States shipyards up to June 30, 194[illegible] the average time elapsed from keel laying to delivery was 63 days. For five Pacific Coast yards which delivered a total of 1137 vessels, slightly more than half of all constructed during this period, the average building time was slightly under 50 days. Atlantic Coast yards averaged 72 days in delivering 782 vessels and Gulf Coast yards averaged 88 days in delivering 287 vessels.

According to the Truman committee's figures for 1943 the national average cost for the construction of 1208 Liberty vessels was $904,30[illegible] each, exclusive of builder's fee and cost of material supplied by the government. Average manhours per hull were 565,800. For the 642 vessels delivered by the five Pacific Coast yards including one high cost yard that delivered only ten ships that year, the corresponding figures were $734,30[illegible] and 434,100 manhours per vessel, [illegible] per cent below the overall average.

FLOATING GARAGE: *The flight deck of this first line U. S. Navy Aircraft Carrier is almost completely covered with Marine trucks, jeeps and other motor vehicles being ferried to an undisclosed Pacific base.*

*Die and tool work demands accuracy of*

# FOSDICK JIG BORER




On particularly close tolerance work, such as making the illustrated, Fosdick Jig Borers demonstrating their ability meet the exceptional accuracy demanded in hundreds of rooms and tool and. die ops.

The machine is exceptionally gid—for example the bed of gged construction is heavily bed to avoid distortion. A ree point bearing serves for veling and maintains perfect gnment. A sturdy sliding head pports spindle close to the ork.

Operation is also very simple. l controls are centralized for se of control. Twelve speeds geometrical progression from to 1500 RPM are instantly tained thru a single lever. ine feeds from .00125 inch to 10 inch are available thru a gle control lever with direct ading index.

Thus the Fosdick Jig Borer ofrs all the advantages of high iced precision machines at a mparatively low cost. If you ve a precision drilling—boring facing or even light milling eration—put it on a Fosdick r speed—accuracy and low st.

*full descriptive bulletin is ailable—ask for Fosdick Jig Borer Bulletin J.B.I.*

**FOSDICK MACHINE TOOL COMPANY**
CINCINNATI 23, ··· OHIO

for cost and 23 per cent below for manhours.

From now on out, this coming year and for several years even after the cessation of Pacific hostilities, naval and maritime repair work will be primary. Already over 5000 merchant vessels operated under the jurisdiction of the War Shipping Administration have received major repairs at West Coast yards. The five Navy yards with their approximately 100,000 workers are generally assumed to be almost entirely engaged on repair work and are constantly and desperately adding to their personnel.

Strangely enough those maritime and commercial yards which previously were engaged in new construction and are now switching over to repair work are releasing a large number of men. One yard on San Francisco Bay had 35,700 workers in July, 1943 and is now below 15,000 and will probably level off at 10,000 for its extensive repair program. Floating drydocks are mysteriously and surreptitiously all over the place out here, for there is necessary secrecy and reluctance to disclose the extent and amount of battle damage either to fighting or merchant ships. It can safely be assumed, however, that whatever the pressure now, the crest has by no means been reached and as Pacific operations accelerate, and if and when a substantial part of the Atlantic supply fleet is diverted to the Pacific, the repair, maintenance and operating load will be a challenge indeed. Preparations are actively and earnestly underway to meet that challenge.

* * *

**That the Army** scrap one-fourth of its airplanes every year after the war as a spur and incentive to private industry and to take advantage of technological developments was the proposal last week of Eugene E. Wilson, president of the Aeronautical Chamber of Commerce of America and vice-chairman of the board of United Aircraft Corp. when he addressed the west coast Aircraft War Production Council "We must junk war-weary airplanes after the war and start out a new procurement program. We must never repeat France's fatal mistake after the last war when it retired the greatest air force in the world to warehouses and nationalized its aircraft industry. In the next two decades it destroyed its air force while the United States, through competition in private industry, developed the finest planes in the world."

Although Mr. Wilson grants that 3000 transport planes will be sufficient for America's postwar commercial operations, he anticipates that private flying may easily require 100 times this many smaller planes and that the total volume output may well exceed the currently estimated 10 per cent of war production.

Despite 12,000 engineering changes in aircraft produced on the west coast last year, Brigadier General Donald F. Stace, commander of the western district Air Technical Service points out that west coast aircraft plants built a fourth of all the planes made in the United States and their aggregate weight was one-third of the nation's output. On a weight or tonnage basis, the west coast's 1944 production was 15 per cent over 1943 and 127 per cent over 1942.

* * *

**Hayward C. Thomas,** president of Clarke Areo-Hydraulics, Inc., of Pasadena has been elected president of the Aircraft Parts Manufacturers Association in Southern California. F. W. Wilkins is vice-president, J. D. McDonald, secretary and Ralph Middleton, treasurer. Russell Amory continues as general manager with offices in the Chamber of Commerce Building, Los Angeles.

## Farm Labor Swells Factory Employment

***Chicago***

• • • **Drain of farm** labor to man war production lines has resulted in the employment of over 40 per cent of all midwestern workers in factories and manufacturing employment in 1944, roughly 50 per cent greater in numbers than in 1940, a Federal Reserve Bank survey shows.

Manufacturing employment in Illinois, Indiana, Iowa, Michigan and Wisconsin has increased from 2.2 million persons in 1940 to 3.3 million in 1944, more than 68 per cent of whom currently are engaged in munitions manufacture. The gain has occurred despite withdrawal of more than 2 million persons by the armed services. Part of the replacement has been through raising the proportion of women employees from 18 per cent in 1940 to an estimated 30 per cent at present.

Employment trends here have lagged behind the rest of the country, just as did construction of war facilities and war contract awards. Manufacturing employment for the nation leveled off in August, 1943, and began a gradual decline after November, 1943. Manufacturing employment here continued to expand through November. 1943, and has since declined at a smaller rate than in the nation as a whole, according to Federal Reserve. In some industries, such as electrical machinery, transportation equipment and iron and steel, employment in the midwest did not reach its peak until the first quarter of 1944.

"Among the five states, only Michigan actually reached its highest level of wartime manufacturing employment in November, 1943," the survey states.

Recent declines in manufacturing employment are attributed to virtual exhaustion of unutilized manpower resources, continued Selective Service withdrawals of industrial workers, complete withdrawal from employment by many women and older men, and excessive labor turnover.

The degree of current manpower stringency in the five state area comprising the Seventh Federal Reserve District is indicated by a total occurrence of 27 Group I (acute shortage) areas, more than any other Federal Reserve district, and constituting 40 per cent of the national total of such Group I areas.

## Cited for Awards

• • • **The following companies** have received awards for outstanding war production:

***Army-Navy "E"***

**Phelps Dodge Copper Products Corp., Inca Mfg. Division, Ft. Wayne, Ind. (fourth star)**
**Cleveland Twist Drill Co., Cleveland (fourth star)**
**Hosdreg Co., Huntington, Ind. (fourth star)**
**Simmons Machine Tool Corp., Albany, N. Y. (fourth star)**
**Illinois Gear & Machine Co., Chicago. (third star)**
**Gould Pumps, Inc., Seneca Falls, N. Y.**
**General Cable Corp., Rome, N. Y. (third star)**
**Trackson Co., Milwaukee. (second star)**
**Infilco, Inc., Chicago. (second star)**
**Thew Shovel Co., Lorain, Ohio.**
**Metal Specialty Co., Cincinnati. (third star)**
**Skilsaw, Inc., Chicago. (third star)**
**Artcrest Mfg. Co., Chicago.**
**Chandler-Evans Corp., Dayton, Ohio.**
**Diecasters, Inc., Ridgefield, N. J.**
**Manufacturing Industries, Inc., Chicago.**
**A. J. Miller Auto Cruiser Trailer Co., Inc., Bradenton, Fla.**
**Monarch Marking System Co., Dayton, Ohio.**
**Nuodex Products Co., Inc., Elizabeth, N. J.**
**Trumbull Mfg. Co., Warren, Ohio.**
**Zenite Metal Corp., Indianapolis, Ind.**
**J. A. Zurn Mfg. Co., Erie, Pa.**
**Anthony Company, Inc., Streator, Ill. (fourth star)**

***Maritime "M"***

**Cooper-Bessemer Corp., Mt. Vernon, Ohio. (fifth star)**

Teamed with ARMCO Low-Alloy High Strength Steels these stiffeners (and many variations of their basic design) help engineers create lighter, stronger structures. They cut "dead-weight" and increase efficiency of transportation equipment and other products as well.

Through the use of stiffeners and other improved designs, the sheet steel shell of the product now bears an ever-increasing part of the total load. This is made possible by steels like ARMCO 50Y and 55Y — with minimum yield strengths of 50 and 55 thousand psi. respectively. Designers can increase the load the members will stand or use lighter gages with the same loads.

For some uses, lighter-than-conventional gages can be employed without reinforcement of any kind. This helps save steel and cuts costs.

Besides these advantages, ARMCO Low-Alloy High Strength Steels are easily fabricated and have excellent welding properties. Corrosion resistance of ARMCO 50Y and 55Y is considerably greater than that of ordinary steel. Where extra rust resistance is needed, zinc or aluminum coatings can be applied.

Write us for complete data on ARMCO Low-Alloy High Strength Steels. It may help you design your new or improved peacetime products with less weight and greater efficiency. The American Rolling Mill Company, 621 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

**THE AMERICAN ROLLING MILL COMPANY**

ARMCO HIGH STRENGTH STEELS

# PERSONALS

• **H. I. Markham,** formerly vice-president, has been elected president of the Parker Appliance Co., Cleveland, to succeed the late Arthur L. Parker.

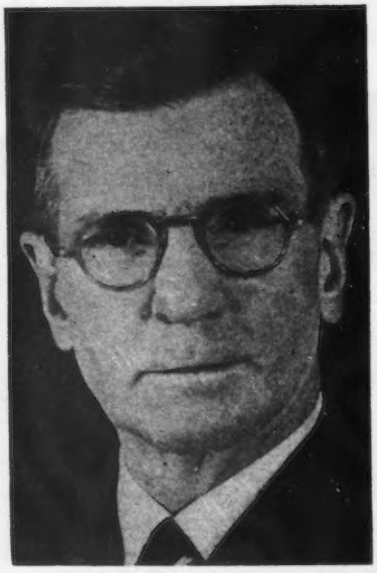
• **Archibald J. Cooper** has been appointed manager of the New York district office, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Cooper, formerly assistant manager of the New York office, succeeds **A. F. Rolf,** who will now devote full time to his duties as assistant secretary of the company.

• **George L. Morris** has been elected vice-president in charge of the Wire and Special Machinery Division, Syncro Machine Co., Perth Amboy, N. J. Mr. Morris will continue as general sales manager in addition to assuming his new duties. **Ernest W. Clark,** formerly with the General Electric Co., has joined Syncro as a consulting engineer.

• **Norbert E. Smith,** since 1936 a representative of the Chicago district sales office for Indiana, Inland Steel Co., Chicago, has been named district sales manager for the company's newly established Indianapolis office.

• **C. O. Kleinsmith** has been elected a vice-president of National Carbon Co., Inc., Cleveland. Mr. Kleinsmith, associated with the organization since 1919, was general sales manager for the company's "Eveready" products prior to his recent appointment. **D. B. Joy,** who joined the company in 1923, has been appointed general sales manager for carbon products and **R. P. Bergan** has been made general sales manager for consumer and related products.

**C. O. KLEINSMITH, vice-president, National Carbon Co., Inc.**



**JOHN R. MUNN, president, Elastic Stop Nut Corp. of America**

• **John R. Munn,** a director since 1927 of the Elastic Stop Nut Corp. of America, Union, N. J., has been elected president of the company to fill the unexpired term of the late William T. Hedlund.

• **Everett C. Hite,** has been appointed combustion and refractories engineer, Steel Mill Metallurgical Department, Timken Roller Bearing Co., Canton, Ohio.

• **Frank H. Saniter,** deputy director of the Iron & Steel Division, British Raw Materials Mission, Washington, has been appointed director of research to the United Steel Companies Ltd., and will return to the United Kingdom shortly.

• **Frederick W. Moore** has been appointed general production manager of the Propeller Division, Curtiss-Wright Corp., Buffalo; **Joseph R. Eggert** has been made plant manager of the organization's plants at Caldwell and Clifton, N. J., and **George L. Lang,** plant manager of the division's propeller plant in Indianapolis.

• **Joseph A. McGrane** has been appointed field service engineer in Detroit for the Rustless Iron & Steel Corp., Baltimore.

• **R. J. Herbenar** has joined the Craine-Schrage Steel Division of Detroit Steel Corp., Detroit, as chief metallurgist.

• **Theodore A. Harper** has been appointed manager of cold finished bar sales for Grammer, Dempsey & Hudson, Inc., Newark, N. J.

• **R. S. Hudgins** has been appointed plant superintendent of Kennametal Inc., Latrobe, Pa., succeeding **W. E. Newcomer,** resigned. Prior to his recent appointment, Mr. Hudgins was tool engineer and representative for Latrobe at West Hartford, Conn.

• **Frederic H. Wright,** until recently supervising engineer of the secondary metals section, U. S. Bureau of Mines, has joined **Lucius Pitkin, Inc., New** York, as assistant to the president.

• **Charles S. Mattoon** has been appointed industrial relations director of the Weatherhead Co., Cleveland. Prior to joining Weatherhead, Mr. Mattoon was associated with the Curtiss-Wright Corp., where he directed industrial relations of the Airplane Division.

• **George C. Lea** has joined the Ohio Nut & Bolt Co., Berea, Ohio, as vice-president, succeeding the late Homer J. Wilkinson. Prior to the past two years in which he served as lieutenant commander in the Navy, Mr. Lea was associate counsel of the American Institute of Bolt, Nut and Rivet Manufacturers.

• **W. W. Gleeson** has been appointed vice-president and general manager of the L. G. S. Spring Clutch Corp., Indianapolis, a Curtiss-Wright Corp. subsidiary. Mr. Gleeson has been with Curtiss-Wright since 1936, holding positions in several different departments of the corporation's manufacturing divisions and recently serving as general production manager of the Propeller Division at Caldwell, N. J.

**W. W. GLEESON, vice-president and general manager, L. G. S. Spring Clutch Corp.**

# Northern SUPER-CRANES

## MATERIALS HANDLING CAN'T BE SUBCONTRACTED

lathe, shaper, milling machine or other tool breaks down may be in serious difficulty. But work can be subcontracted ys found to meet the emergency.

f a crane breaks down, the shop it serves is tied up until irs are made. Materials Handling is one job that *can't* be ontracted. You *have* to have reliable cranes for the heavy of war production.

**THERN USERS HAVE ASSURANCE OF RELIABILITY IN THESE USIVE FEATURES:**

- id one-piece welded steel trolley construction.
- nsmission type single unit, oil tight gear reduction.
- ily removable gear case covers. Splash lubrication of gears.
- avy section girders designed for extreme lateral and vertical loads.
- avy duty roller bearings, turned and ground shafts, press fits on wheels, etc.
- ndard heavy duty anti-friction bearing crane motors—oversize for service.
- ntrol equipment built by the outstanding specialists in industrial d.
- ecial heavy duty crane wiring construction to insure safety and ate wiring troubles.
- it bridge drive mechanism combined with heavy welded steel end
- ist and bridge brakes designed for extreme loads and hard service.

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JOHN LUCAS, president and general manager, Yoder Co.

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• **John Lucas,** formerly vice-president and assistant general manager of the Yoder Co., Cleveland, has been elected president and general manager, succeeding the late Carl M. Yoder, one of the founders of the company. Mr. Lucas joined the company in 1935 as general sales manager, having previously been with the Lewis Foundry & Machine Co., Pittsburgh. **Frank Sargeant,** formerly assistant treasurer, has been elected assistant secretary and assistant treasurer.

• **Marvin A. Knoller** has been reappointed field manager in Wisconsin and Iowa for the Electric Refractories & Alloys Corp., Buffalo, after serving 31 months in the Army. Mr. Knoller will make his headquarters at Milwaukee.

• **Robinson Ord** has been appointed acting general manager of sales, Organic Chemicals Division, Monsanto Chemical Co., St. Louis, pending the return to duty of Fred C. Renner, who is recuperating from a serious illness.

• **George A. Fort** has been appointed plant industrial engineer and **Milton L. Weislogel,** assistant plant industrial engineer of the Gary works, Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Fort joined the staff of the chief industrial engineer, Pittsburgh office of Carnegie-Illinois in 1936, and since 1943 has been assistant plant industrial engineer at the Gary works. Mr. Weislogel became associated with the corporation in 1936 and since 1941 has been assistant to the division superintendent, coke works and blast furnaces.

• **John N. Heil,** formerly assistant sales manager, has been appointed manager of the new Wisconsin tank sales office of the Heil Co., Milwaukee.

• **A. L. McNeill** has been appointed Chicago district manager of the Okonite Co., Passaic, **N. J. E. H. McNeill,** formerly manager of the power and light department, has been appointed assistant manager, Chicago district, and **Harry D. Pierce** has been made office sales manager.

• **Everett C. Gosnell,** who has been chemical engineer with Lukens Steel Co., Coatesville, Pa., since 1937, has been appointed manager, Chemical Division of Lukens and its subsidiaries, By-Products Steel Corp. and Lukenweld, Inc.

• **C. Fred Hastings** has been appointed general sales manager of the American Central Mfg. Corp., Connersville, Ind. **Byron C. Wagner** succeeds Mr. Hastings as assistant general sales manager.

• **Frederic Crosby,** formerly president of American Hoist & Derrick Co., St. Paul, has been elected chairman of the board. Succeeding Mr. Crosby as president is Harold O. Washburn, formerly vice-president and treasurer. **R. E. Ljungkull,** has been elected vice-president of engineering; **D. B. Botkin,** vice-president of manufacturing; **S. M. Hunter,** vice-president of sales; **J. F. Bishop,** secretary and assistant treasurer, and **R. J. Henry,** assistant secretary.

• **Clifford T. Appleton,** for the past eight months manager of the Machine Division, Rolled Thread Die Co., Worcester, Mass., has been appointed sales manager, succeeding **E. S. Walker,** resigned.

• **J. J. La Salvia,** chief mechanical engineer, and **H. T. Borton,** chief structural engineer, have been elected to the board of directors of the Osborn Engineering Co., Cleveland.

• **Charles E. Kline** has been elected manager of the Electric Welded Tubing Division, Brainard Steel Corp., Warren, Ohio. Mr. Kline had been associated with Steel & Tubes, Inc., Cleveland, prior to joining Brainard a year ago.

• **Milton W. Allen** has been named sales representative for the states of Colorado, Utah, Wyoming, New Mexico and Montana, for The National Screw & Mfg. Co., Cleveland. Mr. Allen's headquarters will be in Denver.

• **Robert T. Dunlap,** vice-president in charge of production, Wickwire Spencer Steel Co., New York, has been elected a member of the board of directors.

• **Thomas I. Lane** has been made assistant to the central district manager, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. Lane has been with Westinghouse since 1918.

• **Otto Tatus,** general manager of National Iron Works for the past six years, has resigned to devote his entire time to his own firm, Continental Engineering Service, Bonita, California.

• **Charles L. Davidson** has been appointed assistant general manager of the Thompson Aircraft Products Co., Inc., Cleveland.

•**G. D. Bassett** has been appointed director of purchases, Standard Forgings Corp., Chicago. Mr. Bassett joined the company in 1916 and served as purchasing agent from 1923 until his recent appointment. **H. W. Campbell** succeeds Mr. Bassett as purchasing agent and **R. H. Foss** has become assistant purchasing agent.

# OBITUARY...

• **Sydney A. Foster,** 58, vice-president, L. B. Foster Co., Pittsburgh, and for many years manager of its New York office, died recently.

• **Fred W. Grant,** merchandising engineer of Norton Co., Worcester, Mass., died suddenly January 25. Mr. Grant had been with the company for 32 years.

• **Howard T. Brinton,** assistant manager of sales, Wheeling Corrugating Co., Wheeling, W. Va., died January 28.

• **Herman C. Dreis,** founder of the Dreis & Krump Mfg. Co., Chicago, died January 19.

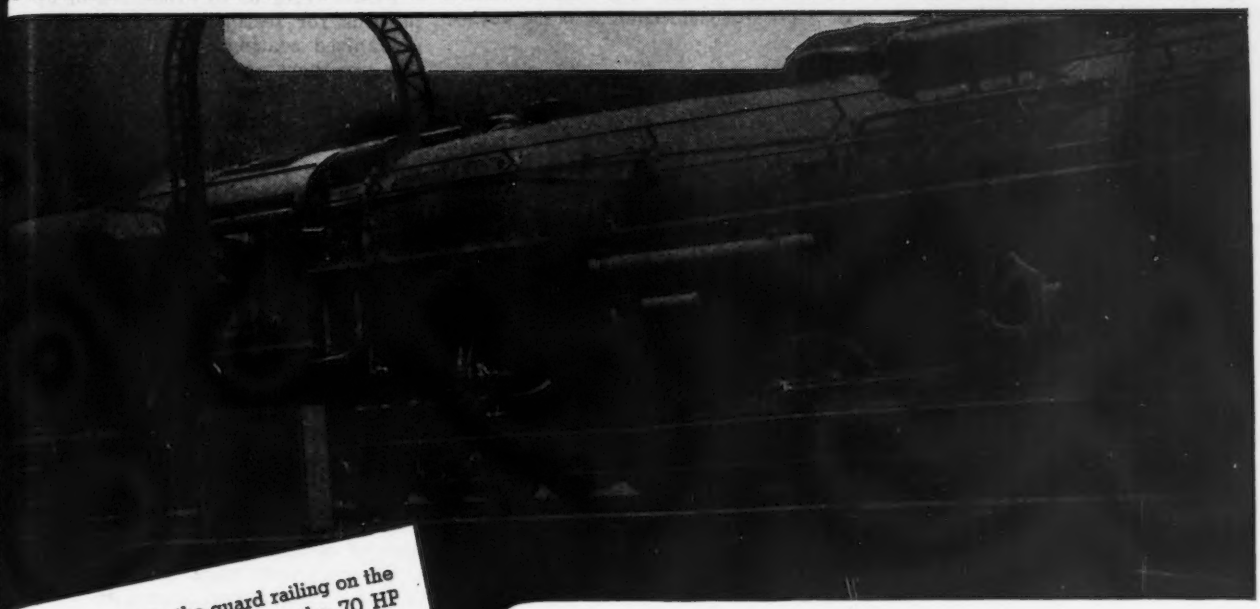
• **Raymond I. Caspers,** 66, co-chairman and secretary of Caspers Tin Plate Co., Chicago, died January 23. Mr. Caspers and his associate, A. E. Thiffault organized the company in 1922.

• **Arbin J. Stieglitz,** 50, manager of priorities for the Milcor Steel Co., Milwaukee, died January 18.

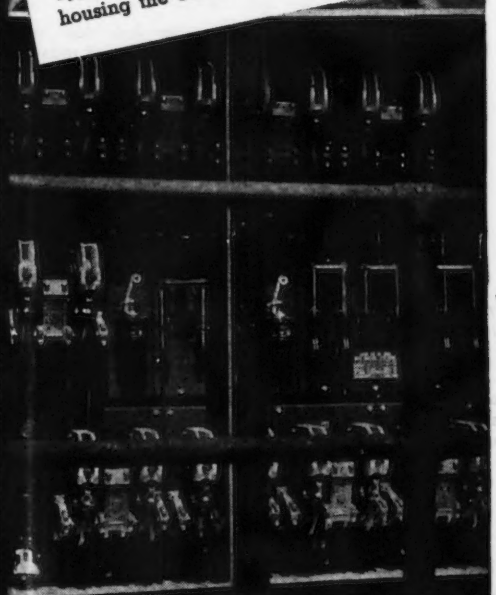
• **George W. Keller,** 67, for the past ten years a consulting engineer for the Vilter Mfg. Co., Milwaukee, died recently.

# EC&M
# DUPLEX·CONTROL

## SURES EFFICIENT OPERATION OF 2-MOTOR ENGINE-TURNTABLE

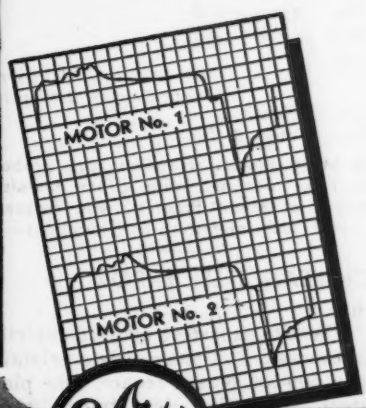


Taken through the guard railing on the turntable, this photo shows the 70 HP EC&M Duplex TIME-CURRENT Controller for operating this table. Rear of Type III (weather-resisting) cabinet housing the control is shown above.



TO drive turntables serving engine roundhouses, two identical motors connected in parallel are generally used.

The graphic ammeter curves, below, show the efficient operation of these 2-motor drives obtained with EC&M Duplex Control. Superimposing one curve on top of the other shows that current values at any point on the curves—during starting, accelerating, running, or plugging—are practically duplicates of one another.




Duplex controllers are built for both a.c. and d.c. service. They are available, when desired, with transfer knife switches which permit isolation of either motor circuit for emergency single-motor operation. Complete information gladly furnished on request.

THE ELECTRIC CONTROLLER AND MANUFACTURING CO.
2698 EAST 79TH STREET CLEVELAND 4, OHIO

# Dear Editor:

## PRICES AND PRODUCTIVITY

Sir:

I was interested in T. W. Lippert's review article in the Jan. 4 issue. A number of the points he made have not been adequately recognized publicly and I think we are all indebted to him for emphasizing them.

For example, he mentions the problem of selling high priced products in a generally deflated postwar world. In this connection I should like to call your attention to the enclosed photostat from the Mutual Aid British White Paper of November, 1944, showing relative prices of British and American metal products. Britain's wage scale has always been approximately half the United States', and that factor taken in conjunction with the depreciated pound, the tremendous movement of American machine tools into British factories, the increased level of industrial effort in Great Britain compared with a declining amount of individual worker effort in this country, tends to bring the British costs down well below ours, even on items which we were able to export in competition with Britain prior to 1939.

On the question of the industrial productivity, you may be interested in the enclosed summary of the Bureau of Labor Statistics' index of output per manhour. I have averaged all the industries where the products were substantially unchanged during the last five years. This index reflects the failure to increase output per manhour despite the increased volume which industries enjoy, and possibly reflects the lower quality of industrial effort over here.

*ANDREW T. COURT*
*1517 Iroquois, Detroit 14*

## INEXPENSIVE PHOTOMETER

Sir:

In the description of a photometer for metallographers in the May 11, 1944 issue, parts required included INCA D-1 choke, INCA TG-10 transformer, and Hadley Type P-6211 transformer. Local electrical supply stores are unable to identify these items and additional information would be appreciated.

*JOHN F. HARDECKER,*
*Head, Materials Division*
*Aeronautical Materials Laboratory,*
*Naval Air Experimental Station,*
*Philadelphia 12*

● INCA choke and transformer manufactured by Thermador Electrical Mfg. Co., South Riverside Drive & Atlantic Blvd., Los Angeles. Identification numbers have been retained, but these parts are now identified as Thermador instead of INCA. Hadley type transformer is a product of Robert M. Hadley Co., 707 East 61st St., Los Angeles. —Ed.

## PIPE FLANGING

Sir:

Please inform us on concerns manufacturing 0.5-in. pipe flanging machines.

*PALMER D. WEEKS*
*401 S.W. 1st Ave.,*
*Portland 4, Ore.*

● A list of manufacturers is on the way.—Ed.

## TIPPED CUTTING TOOLS

Sir:

Compliments to you on the article "Tipped High Speed Steel," by F. J. Oliver in the Jan. 18 issue. Would like an additional copy.

*L. W. LANG*
*National Tool Salvage Co.,*
*6511 Epworth Blvd., Detroit 10*

● Tear sheets have been mailed.—Ed.

## PHYSICAL PROPERTIES?

Sir:

Since THE IRON AGE is a technical journal may I ask why Americans talk about physical properties when they mean mechanical properties? What word is used when they intend to speak about physical properties?

*A. L. K. HONEGMAN,*
*Research Laboratories*
*Colvilles Ltd., Motherwell,*
*England*

● It is rather loose usage, but technical men in this country habitually use the term physical properties to describe true physical properties as well as mechanical properties of metal. Some even go as far as to use the term "physicals."—Ed.

## LADYLIKE MICROGRAPH

Sir:

Here is an interesting micrograph taken from an experimental high temperature metal that looks very much like the photograph of a middle-aged lady.

*J. D. NISBET,*
*Supercharger Laboratory*
*General Electric Co.,*
*Fort Wayne 6, Ind.*

● Many thanks. However, you probably have us confused with either Metals & Alloys or Metal Progress, who frequently publish such interesting configurations.—Ed.

## CHILEAN STEEL ERROR

Sir:

The Chilean steel project described in the Jan. 11 issue consists primarily of a 500-ton blast furnace, coke plant, steel production department, structural and rail mill, and finishing mills. The mill purchased from the Worth Steel Co. comprises four 2-high stands, motor and auxiliary equipment costing less than $160,000. Electric smelters are not contemplated. A suitable metallurgical coke can be produced from Chilean coals despite the statement to the contrary.

*ROBERTO VERGARO*
*Corporacion De Fomento De La Produccion,*
*120 Broadway, New York 5*

● These misstatements are regrettable. However, the article was based upon information believed reliable.—Ed.

## ZINC THICKNESS GAGE

Sir:

Please refer us to producers of apparatus for testing the thickness of galvanized coatings. In this connection are there any tables for converting from ounces of zinc per sq. ft. to thickness in decimals of an inch?

*H. A. SHERER,*
*Chief Engineer*
*Reeves Steel & Mfg. Co.,*
*Dover, Ohio*

● Kocour Co., 4724 S. Christiana Ave., Chicago, has developed a chemical method of determining the thickness of metallic coatings, and General Electric Co. manufactures an electrical gage for the purpose. There are no published tables for the conversion desired, but New Jersey Zinc Co., 160 Front Street, New York, advises that 1 oz. per sq. ft. corresponds to 0.00172 in. of zinc, and a thickness of 0.001 in. takes 0.583 oz. per sq. ft.—Ed.

## IRON ORE DEPOSIT

Sir:

We are considering buying a deposit of Hematite iron ore containing 47 per cent iron, ranging from 18 in. to 8 ft. in depth and located in western Pennsylvania, adjacent to an abundant supply of limestone. What is your opinion of the quality and commercial value of such ore, and the approximate market value per acre?

*LEWIS FEINGOLD*
*503 Glen Echo Rd., Philadelphia 19*

● It is always difficult for an individual to market iron ore deposits since a great many factors affect their value. The content of 47 per cent iron is a little low but if available in large quantities and if other elements are satisfactory, it is possible that some of the large steel companies might be interested.—Ed.

## TUBE ROLLING

Sir:

Who are the manufacturers of tube rolling machines capable of producing tubes from 30 gage cold rolled perforated strip 2¼ in. wide, rolled to 11/16 in. outside diameter with a welding lap of 1/16 in.?

*H. DANIN*
*W. B. Connor Engineering Corp.*
*114 E. 32 St., New York*

● There are only a few manufacturers of machinery for rolling strip into tube form for welding. Their names have been forwarded. —Ed.

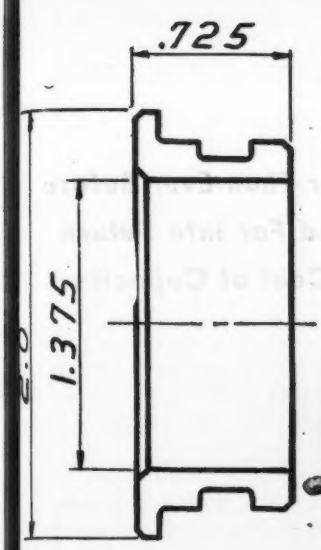
## BLANKING DIES

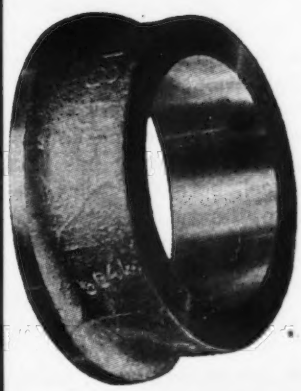
Sir:

Please send three reprints of "Non-Ferrous Blanking Dies" from the Aug. 17, 1944 issue.

*G. N. DONOVAN*
*Western Electric Co.,*
*Kearny, N. J.*

● Reprints have been mailed.—Ed.





# 38 *seconds* FROM FLOOR TO FLOOR

## . . . AND FINISHED TO .0003"

Spindle speeds of 5,000 rpm permit fast machining of these aluminum aircraft bushings with high speed and close tolerances on Monarch 10" Production Lathes.

The first operation takes only 9 seconds cutting time to turn OD flange, face flange end, bore and chamfer inside and outside. Floor to floor time, 20 seconds.

The second operation, in 8 seconds cutting time turns OD, faces inside flange, faces small end, grooves and chamfers small end. Floor to floor time, 18 seconds.

Such high speed spindle operation is made possible by Monarch's improved lubrication of the precision spindle bearings, to permit cool, distortionless, high precision machining.

When war work is finished, these lathes will head the list for conversion to peacetime production. Stepless range of speeds, simple tooling, quick operating cycle and ease and speed of control will enable every machine and operator to turn more work per day . . . and keep costs down.

If you are interested in the cost-cutting possibilities of Monarch 10" Production Lathes, our engineers will work with you.

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801 Fisher Bldg., Detroit 2, Mich.
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*Representatives in principal cities*

Feed: .002"
Tolerance: .0003"
Spindle speed: 5,000 rpm
Surface cutting speed:
2500 feet per minute

# *Monarch Saves Time*

# This Industrial Week . .

- **Steel Order Tempo Now Greater Than Ever Before**
- **Delivery Promises Have Extended Far into Future**
- **Steel Ingot Rate Sags to 87 Per Cent of Capacity**

STEEL order tempo with complete emphasis on urgent war shipments was reaching the boiling point this week and represented a condition not even comparable to any previous period since the war began. So much was this a fact that the War Production Board, Steel Division, seriously undermanned by the new emergency, was recalling top-notch steel men to jobs in the WPB. At least four or five steel executives had been contacted and have agreed to help the WPB over the hump.

Heavier order volume than for several years combined with disrupted production schedules during January to produce a more chaotic delivery situation than at any time since the war began. Even in the critical Chicago district, where weather and manpower difficulties have been less severe than elsewhere, January, 1946, deliveries are being quoted on some items in heavy demand for war programs. With the force of a desert torrent vast incoming orders have swept deliveries on nearly all items ahead two to six months during the past 30 days.

The new war requirements, which appear with a suddenness of a thunder clap and which are as apt to be as suddenly changed, have made it necessary for a tremendous increase in WPB directives in order to obtain the materials when desired by the armed forces. This situation has so complicated the steel scheduling picture that carryovers were mounting at an ever accelerated rate. It is hoped by both the steel industry and the WPB that the return of more steel executives to the steel division will permit unraveling of some of the temporary confusion.

Slight improvement in delivery promises on hot rolled pickled sheets, one of the most delayed items, is reported by one producer now offering August deliveries. This is offset, however, by another mill's quotation which was changed from August of this year to January, 1946. Heavy gage galvanized sheets which a few weeks ago were available for August delivery are this week being quoted for November this year to January, 1946, delivery.

WHILE standard structural shapes were being quoted at the beginning of this year for April delivery, they are not now available until May or June. However, heavy directives make such delivery promises relatively nominal. Common alloy bars which a short time ago were available for almost immediate delivery are now being promised for April shipments in electric furnace grades and June and July in open hearth grades. Indications are that this situation will prevail throughout the first quarter at least, and may grow tighter.

Reflecting the quick change in the flat rolled picture, strip which recently was quoted for May delivery is not now available before August. In the same period of time cold rolled sheet promises have jumped from May to September and October. Only in plates, available in July—and in wide sizes in April—tin plate with some March openings and plain finished stainless sheets, with April openings, has the situation been static.

Even the delivery dates being made today represent merely markers tossed in a moving current because frantic efforts by the military to squeeze in at the head of the order stream have resulted in CMP orders being displaced by order directives. According to some thinking in the steel trade, only by a realistic appraisal of the relative value of their own orders by the claimant agencies themselves including the Army and Navy can a possible breakdown in the controlled materials plan method of ordering steel be averted.

BECAUSE of severe weather, freight tieups, and fuel shortages, important steel producers last month failed to meet their minimum production directive goals by as much as 7 per cent, not to mention overloaded tonnage which they were unable to handle. Mills in less affected districts were able to make fair progress in attacking flat rolled product carryovers. The industry, however, on an average basis, went into February with carryover tonnage approximating 10 days' production of all products. Because this tonnage is actually concentrated in a few items, the situation is far more serious than this surface view indicates. With backlogs in the neighborhood of six months' total production and further complications likely, nothing short of an end to the European war would relieve the pressure and tightness in the current steel market.

It now appears that the steel industry has been squeezed of its last ton of steel, both for today and tomorrow and for as far into the future as can be appraised. Continued pressure through piling of orders and draining of manpower is not resulting in more steel, but instead threatens to break down the order, distribution and production structure so that less may be produced.

Continued transportation tieups because of severe weather conditions have again cut into the steel operating rate which is down one point this week to 87 per cent of capacity from last week's revised rate of 88 per cent.

The Navy program for 1951 warehouses involves 12,000 tons of corrugated galvanized sheets. Besides the 25 steam locomotives which the New York Central has ordered, the Pennsylvania railroad will acquire 50 new freight locomotives, 25 to be built in its own shops and 25 to be purchased from Baldwin Locomotive. Fruit Growers Express Co. has placed 300 refrigerator cars with Mount Vernon Car Co., and the Spokane, Portland and Seattle railroad has ordered 25 70-ton ballast cars from American Car & Foundry. The War Department has cancelled 1470 20-ton gondolas placed with Pullman Standard, but the United Nations Relief and Rehabilitation authority has placed the same order with Pullman Standard.

• **NEW YORK CENTRAL ORDERS**—The New York Central System has placed orders for the construction of 25 coal-fired steam locomotives of the most powerful type ever used by the company. The locomotives, to be constructed by the American Locomotive Co., will be of not less than 6000 hp. each and are expected to be delivered this year. These will be substantially the same as the experimental 4-8-4 type locomotive, known as the S-1, now nearing completion for delivery to the Central by the same makers. The principal difference, as compared to the S-1, will be in the use of a modified trailer truck, permitting further increase in ash pan volume, which is an important factor in servicing engines on long runs.

• **STRUCTURAL ORDERS**—December bookings of fabricated structural steel for bridge and building construction reported to the American Institute of Scrap Construction by companies representing 79.1 per cent of the total average of the industry during the years 1923-1925, totaled 37,004 tons. This figure compares with 62,437 tons for November and 35,282 tons for December of last year. The reported December shipments for bridge and building construction totaled 61,273 tons as compared with 39,633 tons reported for the same month last year. The reported tonnage available for future fabrication at Dec. 31 was 142,530 tons.

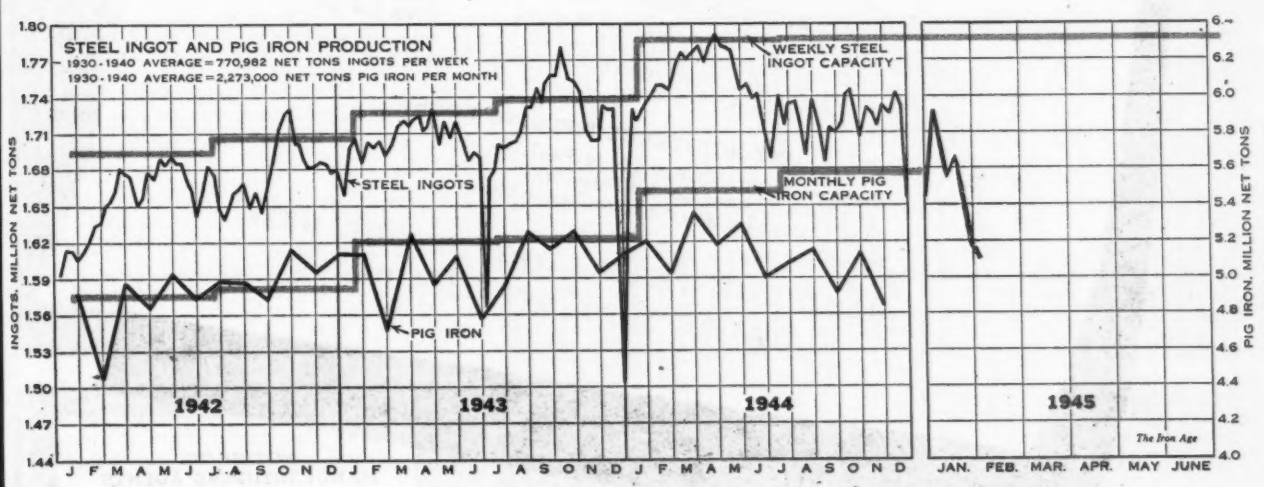
• **MORE TAXICABS—MAYBE**—The ODT probably will lend some support to a proposal which has been newly submitted to the WPB calling for the building of an unspecified, but substantial, number of taxicabs. Their manufacture would take place this year, and probably would amount to several tens of thousands. The likelihood is that some sort of permission to build such vehicles may be forthcoming during 1945 regardless of the fate of other automotive production, due to the specialized yet broad sphere of service filled by the cabs. A further compelling reason for manufacture lies in the fact that repair costs for taxicabs are larger today per year than the cost of complete new vehicles. In other words, replacement parts are probably going into taxicabs in nearly the same volume as duplicates would go into new vehicles. The fact of the matter is that taxicabs, a definitely needed form of transportation, are largely on their last legs. Statistics on file with WPB and others procured from private sources indicate a situation which needs some correcting.

• **NAVY FIRING RATE**—Bethlehem Steel Co. estimates on the basis of Navy data that the 23 battleships of the U. S. Fleet have a firing rate of more than 12,000 tons of shell an hr. With cruisers joining in, that figure would be more than doubled, giving a rate for the two classifications of more than 24,000 tons an hr. Thus, in 1500 hr. these warships would have a firing rate of 36,000,000 tons, or equal to the estimated total annual steel producing capacity of Germany as of the end of 1944.

• **STEEL REPAIRS**—While the freight embargo, the weather and gas shortages have forced many open hearth units down in the Pittsburgh and Buffalo areas, it is expected that steel companies will seize this opportunity to do as much repair work on these units as is possible while they are down. Many of the furnaces were badly in need of rehabilitation and at least some good may be salvaged out of the enforced shut downs. On the other hand, the sudden shutting down of furnaces and machinery because of weather factors may bring about more need for repairs which will show up long after the present production situation has cleared.

• **STEEL CARRYOVERS**—The tremendous volume of steel orders for war purposes has forced the WPB to depend more and more on special directives in order to expedite the production of urgently needed items. This has and is causing a substantial build up in so-called carryovers—orders carried over into a subsequent month from that in which delivery was promised. If this situation is not soon alleviated, carryovers may reach a level not far from the highs of a year ago. The production which has been lost due to storms and weather cannot in many cases be made up and this factor is also expected to eliminate the possibility of paring down carryovers.

• **BELGIAN STEEL FOR U. S.**—More than 300 Belgian plants including steel and foundry units that escaped war damage or have been restored to production, are now turning out war supplies for the United States Army and troops of other Allied nations, under reciprocal aid contracts, according to report just received from SHAEF by the War Department.


STEEL INGOT AND PIG IRON PRODUCTION
1930-1940 AVERAGE=770,982 NET TONS INGOTS PER WEEK
1930-1940 AVERAGE=2,273,000 NET TONS PIG IRON PER MONTH
WEEKLY STEEL INGOT CAPACITY
STEEL INGOTS
MONTHLY PIG IRON CAPACITY
PIG IRON
INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
1942
1943
1944
1945
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
JAN. FEB. MAR. APR. MAY JUNE
The Iron Age

## *Steel Ingot Production by Districts and Per Cent of Capacity*

| Week of | Pittsburgh | Chicago | Youngstown | Philadelphia | Cleveland | Buffalo | Wheeling | South | Detroit | West | Ohio River | St. Louis | East | Aggregate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January 30..... | 77.0* | 100.0 | 84.0* | 95.5 | 77.0* | 29.0 | 91.0 | 97.0 | 96.0 | 92.0 | 101.0 | 94.5 | 95.0 | 88.0* |
| February 6..... | 80.0 | 100.0 | 80.0 | 95.0 | 85.0 | 55.5 | 88.0 | 97.0 | 97.0 | 90.5 | 101.0 | 94.5 | 92.5 | 87.0 |

* Revised

HERE IS OUR COMPLETE

# RACO LINE

**MILD STEEL ELECTRODES**

| | | |
|---|---|---|
| Type—RACO | 7, All Position, Reversed Polarity | AWS E-6010 |
| " | 11, All Position, A. C. | AWS E-6011 |
| " | 8, General Purpose, Poor Fit-up | AWS E-6012 |
| " | 13, General Purpose, Light Gauge | AWS E-6013 |
| " | 20, Horizontal Fillets | AWS E-6020 |
| " | 5, Deep Grooves | AWS E-6030 |

**HIGH TENSILE STEEL ELECTRODES**

| | | |
|---|---|---|
| Type—RACO | 74, All Position, Reversed Polarity | AWS E-7010 |
| " | 64, Horizontal Fillets | AWS E-7020 |

**STAINLESS STEEL ELECTRODES**

| | | |
|---|---|---|
| Type—RACOLLOY | 18-8, Unstabilized | Type 308 |
| " | 18-8Cb, Stabilized | Type 347 |
| " | 18-8(1.5% Mo) | Type 316 |
| " | 18-12(2-3% Mo) | Type 317 |
| " | 18-12(3-4% Mo) | Type 307 |
| " | 19-9, For Welding air-hardening steels | Type 309 |
| " | 25-12, Unstabilized | Type 310 |
| " | 25-12Cb, Stabilized | |
| " | 25-20, Scale-resisting steel | |

**HARD SURFACING ELECTRODES**

Type—RACO 25, 20-25 C Rockwell (Machinable Deposits)
" 45, 40-50 C Rockwell
" 55, 50-60 C Rockwell
RACOLLOY Manganese, Austenitic Manganese Steel

**LIGHTLY COATED ELECTRODES**

| | | |
|---|---|---|
| Type—Blue Label, Sull Coated, Manual Welding | | AWS E-4510 |
| Type "D" Automatic or Manual Welding | | AWS E-4520 |
| Type "D" .30-.40 C, For surfacing | | AWS E-4520 |
| Type "M" Automatic Welding | | |

**OXY-ACETYLENE WELDING RODS**

Type—Red Label Copper Coated Mild Steel
Red Label Copper Coated Pure Iron
RACO High-Tensile, For High-Tensile Steels

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DUNDALK BALTIMORE 22 MARYLAND

SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

# Gas Shortage Persists With Slim Coal Reserves to Cut Operations

***Pittsburgh***

• • • **Operations continued** their toboggan this week. Instead of the estimated 86.5 per cent last week, the district operated at only 77 per cent, and for the coming week the estimate of 84 per cent is believed to be high. The freight embargo and gas shortages are equally important in the curtailment of ingot production in this area, and urgent pleas are being sent out to domestic consumers to ease up on their gas consumption. However, with domestic coal supplies being extremely tight the possibility of a curtailment of domestic gas use is pretty vague.

Hit hardest in the district from the standpoint of steel production was U. S. Steel subsidiaries, mainly Carnegie-Illinois Steel Corp. between the first and second rail embargoes, some 17,000 tons of ingots were lost. During the second embargo and up to midnight Monday, Feb. 5, 38,000 tons of ingots, 26,000 tons of semi-finished, and 46,000 tons of finished steel were lost. These losses were dually the result of gas shortages and rail embargoes.

On Monday there were 44 Carnegie-Illinois open hearths down, but the prospect seemed slightly brighter. It was felt that there would be some furnaces lit at Duquesne before mid-week. Homestead had 12 down, Clairton had five down, Duquesne had 24 down, and three furnaces were down at Vandergrift. Thirty Carnegie-Illinois mills, which includes 11 in Youngstown, have been affected, and from one to eight turns have been lost since the beginning of the second embargo. Most departments had considerable maintenance work to do, and the men were given the opportunity to work if they desired. However, a considerable number elected to take the time off.

Jones & Laughlin Steel Corp., has been the least affected in the district, and its ingot operations have stayed high despite all the difficulties. Since J & L is not dependent upon outside gas supplies to any great extent, neither steel producing or finishing mills have been shut down. From a scrap and coal standpoint, as well as other raw materials, J & L is in a rather enviable position, with supplies on hand at the mills.

Allegheny-Ludlum Steel Corp. figures that because of the gas shortage their total plant operations at both Brackenridge and West Leechburg are down to 15 per cent of capacity. Their steel making operations are still slightly above this average, but finishing mills have been hit very hard by the lack of gas. At least 1100 employees were idle over the week-end, and there is no immediate relief in sight.

The embargo has not had any particular effect as yet on Pittsburgh Steel Co.'s operations but the gas shortage has hit finishing operations very hard at both the Monessen and Allenport plants. At Monessen the company's largest rod mill was down over the week-end as were several finishing operations. The down time on rods, wire, barbed wire, fence, nail and wire fabric ranged from 50 to 100 per cent. Also, one open hearth was shut down because the finishing mills were down.

At Allenport, the cold drawn department was down 100 per cent because of shortage of gas at the annealing furnaces. From Friday night until 8:00 A. M. Monday, it was completely down, and the men were sent home.

Other plants in the district likewise have been hit hard by the gas shortage and operations have been confined to a minimum. Blaw-Knox had a roll shop down, Spang-Chalfant sent 1000 men home from work, and similar occurrences were almost too many to list. In all probability, production for war purposes is lower at present in Pittsburgh than it has been since the start of the war.

Adding to the difficulties is the tight coal supply. The rail embargo last week cut off coal shipments, and industrial stocks are now very low. Normally, considerable quantities of coal moved by barge, but even this has been sharply curtailed. Ice in the river, fog, and difficult navigational problems have made it necessary to cut barge coal movement, especially from the Morgantown, W. Va., area. Barges that normally carry 900 tons are being trimmed down to 700 tons, and tows have been reduced from six to four barges. Mill supplies are running low, with at least two mills in the district reporting less than a week's supply.

Pittsburgh Coal Co. shut down one mine last week because of a shortage of cars, and the Solid Fuels Administration Office here reported that it is likely more mines will go down for the same reason.

Capping all the present difficulties is the constant flood threat. While a slow thaw would not necessarily cause a bad flood, three or four warm days with a steady rain would bring the snow down out of the Allegheny and Monongahela watersheds and could cause an inundation in this area comparable to the 1936 flood. These things Pittsburghers do not like to think about because they have more than their share of trouble now, but the potentiality exists and until all that water has passed Pittsburgh on its way to the gulf, the threat persists.

**PUMPING STATION:** ***Carefully camouflaged against air observation, this pumping station is one of many set up along a pipeline carrying vital fuel oil in France.***

**GUARDSMEN CLEAR SNOW:** *Ordered out by Gov. Dewey, state guardsmen are aiding in snow removal work in upstate New York. Their efforts, with those of furloughed soldiers, promise relief for the nearly stalled railroads in the district.*

## Additional Snow and Embargo Hit Western New York Operating Rate

***Buffalo***

• • • **More snow** and a second freight embargo handed steel production another wallop in this district last week. The ingot rate, which has run up from 29 per cent to 67 per cent in the few days between embargoes sank back to 55.5 per cent.

Bethlehem's Lackawanna plant, operating 10 furnaces a week ago, was at 14, having put on eight and then taking off four of these when the new freight restrictions were imposed. Finishing schedules were adjusted accordingly.

The Republic plant, which suspended steel-making during the first embargo, had six open hearths in operation, but the finishing mills took a holiday on Monday.

Wickwire's open hearths, which shut down last week Tuesday for lack of coal remained dark. The plant had only five carloads of coal and unless more was forthcoming soon, this would be needed for standby purposes. Unless relief is assured, it was indicated the suspension of ingot output might last another two or three weeks.

The plant's rod mill ran out of steel on Sunday and the wire mill, operating on reserve inventories, had only enough billets to keep going to the end of this week.

Difficulty in obtaining empty cars for outbound shipments probably has been a greater influence in causing the curtailment than delays in receiving raw materials, although both are weighty factors.

Shipping and purchasing departments of every plant have been under heavy pressure, trying to locate freight shipments.

Some cars dispatched six weeks ago are still unreported, while others loaded recently have been arriving with a minimum of delay. In some cases, the cars get ahead of the records. The headaches are both numerous and tremendous.

More than 125,000 tons of war steel production have been lost since the first of the year by the three leading mills. At the same time, thousands of tons of finished steel are piled here, there and everywhere in the plants, awaiting empty cars. All this is directly chargable to the unprecedented snow fall and consequent rail congestion.

Meanwhile, Governor Thomas E. Dewey mobilized units of the state guard in western New York to help the railroads dig out. With the added assistance of soldiers furloughed by the War Department to operate rail equipment which had been immoblized by the manpower shortage, the steam carriers appeared well on the road to recovery. Hopes were expressed on all sides that the second embargo would mark the end of the series of emergencies faced by the roads—and industry—in the last two months.

## Fire, Explosion Hit Republic Plant

***Cleveland***

• • • **Three of the** five blast furnaces at the Corrigan, McKinney Division of the Republic Steel Corp., Cleveland, were temporarily banked last week when explosion and fire struck the plant twice within 24 hr., causing more than $500,000 damage and a production curtailment of 3000 tons of steel.

Originally the blaze, whose cause is still unknown, destroyed the benzol loading platform and was marked by five explosions that threw sheets of flame into the air and brought about precautionary evacuation of the area. Starting in a 10,000-gal. benzol tank, which at the time held about 2000 gal. of the highly inflammable coke by-product, the second fire was held in check by firemen who fought furiously to keep the flames from spreading to two other tanks about 50 ft. away on either side, one containing about 4000 and the other about 2000 gal. of benzol.

During the original fire, steam was turned into the batteries of coke ovens as a precautionary measure against the spread of the blaze, making necessary the banking of the three furnaces. Two of the five were kept in operation by the use of coke from Republic's Warren plant and from the American Steel & Wire Co. Shortly thereafter, 49 carloads of coke were brought in and the furnaces were able to resume full operation.

There were no injuries and company officials said that no one would be laid off as a result of the fires. James L. Hyland, Republic district manager, said the damage from the two fires would be "well past $500,000 and might reach $1,000,000."

While suffering from the effects of these fires, the Cleveland steel industry was still shuddering from the combined blows of embargoes and abnormal winter weather. The Corrigan, McKinney works operated only six of an estimated seven furnaces last week because of the fires, and estimate a total of 11 furnaces for the week ending Feb. 10.

# WLB Announces Interpretive Ruling for Recent Steel Award

***Washington***

• • • **Steelworkers will not receive shift differentials when working a portion of the time on the second or third shifts but if they continue to work an entire second turn of 8-hr. in the afternoon or night shifts the application of differentials has been left to collective bargaining negotiations. Any agreement reached through such negotiations may be placed in operation without Board approval.**

This is one of nine rulings announced on Feb. 1 by WLB in response to a joint petition of the CIO-USW and the five steelmaking subsidiaries of the United States Steel Corp. for interpretation of some of the provisions of the board's "basic steel" decision of Nov. 25.

Also left to collective bargaining without requiring board approval were the questions of whether an employee's overtime compensation should include the shift premium and whether such a premium should be paid employees qualifying for allowed or reporting time compensations.

Whether a collective bargaining agreement should include a wage reopening clause of the union's demand for a general wage adjustment, the board held, is a matter directly related to the termination clause of the agreement and should be settled by the collective bargaining negotiations. Jurisdiction was retained by the board to determine the termination clause issue, if the parties to the negotiations are unable to reach an agreement.

Pointing out that the issue was not covered by the directive order, the question of incorporating a reopening guaranteed annnual wage clause in a collective agreement, the board said, is to be settled in collective bargaining negotiations.

It was held that the guide posts set by the board under Section X of the directive order, which relates to rate establishment and adjustment, should be incorporated in the collective agreement, either by reference or by the use of the exact language of the directive order, without change. The board said that nothing in this section was intended to preclude the presentation, under the collective bargaining agreement, of grievances based upon alleged improper classifications.

In submitting for purposes of collective bargaining the question as to the amount of time worked in a high-rated job which would justify the transfer to the higher-rated classification, the board pointed out that it had indicated its acceptance of the principle of upgrading when, for a substantial portion of his working time, an employee performs higher-rated job duties.

The parties may agree, the board said, upon extensions of time within which to report to it as to their negotiations concerning severance pay provisions, and the board's approval of such mutually agreed extensions is not required.

The text of the board's ruling concerning the payment of shift differentials follows:

"An employee assigned to the day shift who completes his regular 8-hr. turn and continues to work for a portion of the second turn of 8 hr. into the afternoon shift does not receive the premium rate of 4c. an hr. for the overtime hours worked in the afternoon shift. Similarly, an employee on the afternoon shift who completes his regular 8-hr. turn and continues to work for a portion of the second turn of 8 hrs. into the night shift does not receive the premium rate of 6c. per hr. for the overtime hours worked on the night shift. The Board has made no determination as to the application of this rule in the case of the employee who continues to work an entire second turn of 8 hr. in the afternoon or night shifts. The latter matter is one to be settled by the parties in their collective bargaining negotiations. Any agreement reached by them may be placed in operation without the approval of the Board."

# Canadian Steel Plant Puts New Cold Mill Unit into Operation

***Hamilton, Ont.***

• • • **Dominion Foundries & Steel, Ltd.,** completed the installation of a new cold rolling mill at its plant here in late 1944 and now has placed its new unit in operation. This addition increased the cold rolling capacity to 100,000 tons of tin plate, blue plate or tin mill black a year. In the past five years under the company's expansion program production of cold rolled flat sheet steel has increased from 30,000 tons in 1939 to 75,000 tons in 1944 and with the new addition thus completed the capacity has been brought up to 100,000 tons a year. Dominion Foundries & Steel now is producing alloy steels that had not previously been made in Canada.

BRITISH HOUSING: *General view of some of the 32 temporary houses being erected by American engineers on bombed site at Louchborough Junction, London S. E.*

# OPA Justifies Its Recent Steel Price Hike; More Increases to Come

***Washington***

• • • **OPA is going** to raise the prices of slabs, billets and sheet bars and other semi-finished products wherever it discovers that the out of pocket costs are too great. On the other hand, OPA says that it is going to decrease the prices on some finished products where profit spreads are more than on semi-finished products generally, pursuant to agreements with the steel industry and following the principle of balancing increases with decreases, called "compensatory adjustment."

By way of explaining that the new interim price increases are to be added to the delivered price, and not an addition to base prices, steel price executive Warren M. Huff said recently that this was a deliberate effort by OPA to cause distributers to absorb at least a part of the cost of steel price increases.

OPA says that this policy of requiring absorption at some level above the producer's price will be applied to non-integrated plants also, although when semi-finished product prices are increased, the prices of products produced by both integrated and non-integrated producers will be increased, provided the increase is required to maintain non-integrated mill operation.

Mr. Huff says that OPA is following the price law in requiring absorption and various interpretations of the emergency court of appeals. OPA Administrator Chester Bowles has told a number of industries that this is necessary to check the inflationary pressures facing the nation in 1945. The emergency court of appeals has ruled void escalator clauses attempting to prevent price increase absorption by distributers.

The final fixing of base prices is not expected to be completed until late spring, possibly in April or May, but OPA hopes that some prices will be approved as early as February.

To what extent warehouses and other distributers are going to have to absorb costs of final base prices will not be known until OPA receives a representative cross-section of cost data from resellers. For about six months at least, OPA has tried to get such information from distributers, but says it has been unable to do so.

While following a policy of attempting to level-off price differentials between high and low cost producers, OPA is going to have to increase prices on some semi-finished products. This may result in different margins of profit between integrated and non-integrated producers, particularly where the semi-finished products rolled by non-integrated mills are equally increased in price for both classes of producers.

The reason semi-finished prices were not raised by the interim order of Jan. 11, was that OPA had not completed studies of out of pocket costs. On the other hand, it did not know what the correct base price should be for the finished products covered by the order either. OPA did know that increases would be necessary as a matter of law on these products, and granted what it considered minimums.

Because of the time lag required in finally fixing prices, OPA issued the interim order to partly compensate companies required to make increased wage payments under the WLB wage order. Mr. Huff said that the interim order might compensate for half of the wage increase ordered by WLB.

Between now and April, every interested steel group represented by industry product committees will meet with OPA and price discussions will be governed in general by four principles. These four principles are: 1. The possible inflationary effect of price increases; 2. Compensatory adjustment; 3. Searching examination of extras as well as base prices; and 4. The leveling of price differentials between high and low cost producers so far as is fair and reasonable.

## COMING EVENTS

April 4-6—SAE National Aeronautic Meeting, New York.

April 12-14—Electrochemical Society, Inc., Philadelphia—Atlantic City Congress, Atlantic City, N. J.

April 26-27—Annual Conference, Open-Hearth Steel Committee and Blast Furnace and Raw Materials Committee, Iron and Steel Division, A.I.M.E., Chicago.

CANCELLED

Feb. 13—Pressed Metal Institute, annual meeting, Cleveland.

Feb. 19—Annual World Trade Conference, Chicago.

Feb. 19-22—Annual meeting, Iron and Steel Division and Institute of Metals Division, A.I.M.E., New York.

Feb. 26-March 2—A.S.T.M. 1945 Committee Week, Pittsburgh.

March 19-22—American Society of Tool Engineers, Cleveland.

April—American Zinc Institute, St. Louis.

April 30—May 4—American Foundrymen's Association, Detroit.

May—American Gear Manufacturers Association, general meeting.

May—General Meeting, American Iron & Steel Institute, New York.

American Steel Warehouse Association, 1945 Convention, New York.

## OPA to Simplify Price Modifying Regulation

***Washington***

• • • **A further move to** simplify the regulation that modifies prices established under the General Maximum Price Regulation was announced on Jan. 29 by the OPA. The regulation concerned is Revised Supplementary Regulation No. 14, which now has been broken down into 10 separate supplements.

Originally designed to cover a number of modifications granted on maximum prices issued under GMPR, Supplementary Regulation 14 was issued in July, 1942 and revised the following year. The reorganization now made, puts the material into more convenient form and eliminates obsolete provisions. No price changes are involved, however, and there is no change in the substance of the present provisions.

Purpose of issuing the separate regulations, OPA said, is to furnish industry members with the pricing provisions that relate only to their particular fields. All miscellaneous provisions are now contained in Second Revised Supplementary Regulation 14, and nine separate regulations. Among items covered are machinery, parts, metals, minerals and products.

## ASTM Cancels Its Committee Week Meet

***Philadelphia***

• • • **After consultation with the** Government's War-Committee on Conventions, the American Society for Testing Materials canceled A.S.T.M. Committee Week which had been planned for Pittsburgh, during the week of Feb. 26—and the Spring Meeting of the Society scheduled for Feb. 28, is being postponed.

The Spring Meeting was to comprise a Symposium on Corrosion Prevention which will be held at some appropriate time and place in the future when the present emergency has passed. Further announcement will be made concerning plans for the symposium.

# Steps Involved in Purchase of DPC "Available" and RFC "Surplus" Machine Tools and Equipment Not in Possession of Prospective Purchaser

PROSPECTIVE PURCHASER writes to his RFC Regional Office, describing type, etc., of machine desired. If the location of machine is known Plancor number and inventory number should also be furnished.*

RFC REGIONAL OFFICE checks list of "available"** machines in its region. If on "available" list notifies prospective purchaser of location, availability, Plancor No., number of machine and type of machine.

If "surplus"***

RFC Region, if wanted machine not on Regional "available" list, checks nationwide master list.

PROSPECTIVE PURCHASER requests concurrence of local branch of Government agency on which equipment will operate and notifies RFC Region. RFC Region requests sponsor release through Washington RFC.

RFC REGION of prospective purchaser requests him to submit RFC sales agreement stipulating he will pay applicable price and transportation expense.

PURCHASER negotiates price with RFC Region and latter furnishes shipping instructions to DPC Supervising Engineer in area where machine is located. Purchaser is advised name and location of DPC Supervising Engineer.

PROSPECTIVE PURCHASER is notified of location, Plancor No., inventory No. of machine and type of machine.

SPONSOR is requested by RFC Region to "hold" wanted machine pending inspection.

DPC Washington is asked by prospective purchaser's RFC Region to obtain sponsor release if prospective purchaser still wants machine after inspection.

RFC REGION of prospective purchaser notifies him and RFC Region in which machine is located of sponsor release.

Note: A firm having an urgent need for machines and planning to inspect them at location, may wish to send their representative to any district RFC Office where they think such machines may be located. A prospective purchaser can, in some cases, locate machines which have not yet been added to the master list and circulated to district offices, more quickly by this procedure. Regardless of who locates the machines or where they are located, purchaser's RFC Region arranges the final details with purchaser.

*—If a metal cutting standard machine tool, will negotiate sale on basis of SWPA Formula.
If a metal or other material forming machine tool, OPA formula applies: 8% discount per annum of cost to government from date acquired by government to negotiated sale date. (Pressure forming tools including forms, presses, and dies, also upsetters, forging hammers and cranes.)
If equipment such as furnaces, ovens, and degreasers, or special purpose machines or equipment, negotiated price on basis of cost to government.

**—"Available" machinery is that having been released by lessee for other war contractor or approved civilian production use. (RFC Regional Office maintains list of machines from Plancor's in its region which have had supply contracts terminated.)

***—"Surplus" machinery is equipment that has been released by the Armed Services and the lessee as available for any use.

Temporarily, surplus sales must be approved by an Army-Navy Board Panel.

This chart was prepared from data obtained by the Automotive Council for War Production, Detroit.

# U. S. Steel Sets $30 Million Aside for Retroactive Wage Directive

*New York*

• • • **Because of the recent retroactive War Labor Board wage directive, the United States Steel Corp. in preparing its fourth quarter income statement, included an estimate of $30,000,000 to cover this board ruling. This estimated wage cost resulted in a reduction of $25,700,000 in Federal income taxes and $4,300,000 in income for the fourth quarter of 1944.**

From these figures, which were quoted by Irving S. Olds, chairman, U. S. Steel Corp., it is indicated that on an estimated basis the retroactive feature of the WLB directive while resulting in an estimated cost of $30,000,000, actually cost "out-of-pocket" $4,300,000, because of the consequent reduction for this particular instance in Federal income tax.

Net income for the fourth quarter of 1944 amounted to $10,985,624, equivalent to 54c. a common share, compared with a net income of $13,389,673 or 81c. on common in the fourth quarter of 1943.

Income for the full year 1944 was $60,292,513, equal to $4.03 a common share compared with $62,631,742 for 1943 or $4.30 a common share.

Shipments of finished steel products in the fourth quarter of 1944 amounted to 5,286,322 net tons, as compared with 5,175,186 net tons in the fourth quarter of 1943 and 5,231,612 net tons in the third quarter of 1944. Subject to year-end adjustments, 1944 shipments totaled 21,150,788 net tons, an increase of 1,003,172 net tons over the year 1943. This tonnage was the largest shipped in any year of U. S. Steel's history. The previous record was 20,615,137 net tons shipped in 1942.

Production of steel ingots and castings in the year 1944 averaged 94.7 per cent of rated capacity, representing an all-time high tonnage record for U. S. Steel Corp. subsidiaries.

Labor statistics for the fourth quarter of 1944 and a comparison of the years 1944 and 1943 follow:

| | 4th Quarter, 1944 | Year, 1944 | Year, 1943 |
|---|---|---|---|
| Av. No. of Employees | 301,282 | 314,888 | 340,498 |
| Total Payroll | $246,862,748 | $914,376,325 | $869,298,853 |

Mr. Olds indicated that U. S. Steel is "very interested" in Geneva Steel Co. at Provo, Utah, but added that no conversations had been held concerning the purchase of this plant by U. S. Steel from government agencies.

Mr. Olds also bore out current trade reports when he said that his company is currently in a tight position with respect to coal supplies. He added that this had not only affected steel production weeks, but is likely to reduce operations below schedules in February unless a substantial change occurs in supply, transportation, weather and man-power problems.

**ROCKET TUBES:** *Irving S. Olds, Chairman of the Board, United States Steel Corporation, (right), views rocket tubing ready for shipment from the Gary, Ind., plant of National Tube Company during recent inspection tour. With him is Leo J. Mason, Tube Company vice president. The Gary plant recently started volume production of rocket tubing.*

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## Inland Steel's Ingot Rate in 1944 Average 108.4% of Capacity

*Chicago*

• • • **Inland Steel Co. maintained steel operations last year at a higher continuous rate than during any previous year in its history and averaged 108.4 per cent of rated capacity for the year. A total record production of 3,684,147 ingot tons of steel was made.**

According to the company the demand for many important steel products resulting from war needs has recently been increased beyond any previous requirements for such purposes. The fulfillment of these demands will largely depend upon obtaining sufficient manpower as well as the ability of railroads to continue to move the vast tonnages involved.

Inland reports a net income for 1944 of $10,249,395 or $6.28 per share, compared with $10,801,564 or $6.61 a share in 1943.

Figures submitted in the company's preliminary report reflect all of the presently known requirements for retroactive wages due in accordance with the recent WLB decision.

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## National Steel Income Reflects WLB Rulings

*Pittsburgh*

• • • **National Steel Corp., in a preliminary statement subject to final audit, reports net earnings for the year 1944, after all charges, including provision for retroactive shift differential and vacation pay amounting to $2,000,000 estimated to be due in accordance with a War Labor Board directive, of $10,751,369, equal to $4.87 per share on 2,206,392 shares of capital stock. This compares with earnings for the preceding year of $11,698,362, which equaled $5.30 per share on 2,206,267 shares.**

Net earnings for the fourth quarter of 1944 were $2,670,396, equal to $1.21 per share, compared with earnings of $3,279,885, equal to $1.49 per share, in the fourth quarter of 1943. Third quarter earnings in 1944 were $2,667,515 equal to $1.21 per share.

# Belgian Plants Turn Out War Items for U. S.

*Washington*

• • • More than 300 Belgian plants including steel and foundry units that escaped war damage or have been restored to production, are now turning out war supplies for the United States Army and troops of other Allied nations, under reciprocal aid contracts, according to report just received from SHAEF by the War Department.

Steel mills are rolling rails, I-beams, and T-beams and other material for Allied engineers who are building new railroads and reconstructing bridges and tracks that were damaged by Allied bombings and German demolitions. Foundries are making castings for various kinds of war equipment. Mortars are being turned out for quick use on the battlefront. One mill had rolled 7000 tons of steel rails. Another is producing important tank equipment when it is urgently needed.

Among the contracts of the Belgian plants are one for 2,000,000 jerricans and one for 5000 winterized plywood barracks through numerous subcontracts.

Other plants are producing 750 tons of bolts, 700 tons of nails, and 1,000,000 washers, most of which are to be used in assembling the hospital buildings. Capt. Carroll C. Goss of Castlewood, Va., a general purchasing agent officer, coordinates production with Army orders in one Belgian industrial area.

"We get all kinds of orders," Captain Goss said. "Recently one came in for tiny night lights on 155 mm. howitzers. Although the factory technicians had never seen a bulb exactly like the ones called for, they produced the desired quantity immediately."

Inspection is maintained by United States Army officers in all factories.

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CENTER

BRIDGE PARTS—*U. S. Engineers, working in Belgium under advance section, Com Z, use a crane to unload heavy bridge material from a freight car. This steel was produced in Belgium.*

o o o

RIGHT

SNOW PLOW—*Combat engineers weld a snow plow to a truck. These plows are necessary because of recent snow storms in Belgium.*

o o o

TANK THREADS—*In a Belgium factory now working under U. S. contract, workers chip newly made extended end connectors used for U. S. tank threads.*

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# U. S. Steel Serves Official Notice of Interest in Western Steel

*San Francisco*

• • • Released at offices of the United States Steel Corp. subsidiaries, a statement by President William A. Ross of the Columbia Steel Co., the corporation's Pacific Coast subsidiary, said that the government has been advised that the corporation is interested in discussing a possible basis of purchase of the government-owned steel plant at Geneva, Utah, for postwar operation. Incorporated in the statement was a recent letter from President B. F. Fairless of the corporation to the chairman of the Defense Plant Corp., owner of the Geneva mill, in which Mr. Fairless said that when either or both of the plants at Fontana, Calif., and Geneva are no longer needed for present or future war efforts and disposal of the facilities to private interests is under consideration, "we would be interested in discussing with your representatives a possible basis of purchase or lease of all or a part of such facilities for operation as part of the Columbia Steel Co." Mr. Fairless added that if a mutually satisfactory arrangement were made to purchase or lease all or a part of such facilities, efforts would be made to operate them at as high a rate of capacity as would be warranted by the market for their products in the territory naturally served by their facilities.

Mr. Fairless' letter, like Mr. Ross' statement, emphasized the steel corporation's interest in the possibilities for postwar production of steel west of the Rocky Mountains.

Mr. Ross said that recent discussion in the press may have led some exponents of the further industrial development of the far west to jump to the conclusion that United States Steel and Columbia Steel have little interest in the future of the new government-owned plant at Geneva.

"Any such impression is quite contrary to the truth. This plant in Utah was designed and built for the government by Columbia Steel Co., acting on behalf of United States Steel Corp., and is now being operated for account of the government by another subsidiary of United States Steel, such construction and operation being a war project undertaken by the steel corporation without any fee or profit," Mr. Ross said.

The steel corporation, he pointed out, is also an exponent for the continued industrial development of the far west. To support this statement he pointed out it recognized the importance of Pacific Coast steel markets and their potentialities when in 1930 it acquired Columbia Steel, whose finishing facilities in California the past few years have been substantially extended and modernized by the expenditure of large sums of money.

Mr. Ross said that Columbia has plans for further enlargements and modernization of its facilities to keep pace with the industrial growth and development of the Pacific coast area.

"Undoubtedly the acquisition of the government's steel mill at Geneva upon some mutually satisfactory basis and the installation of any required additional finishing facilities could be made to fit in with this postwar program, without causing the abandonment or curtailment of Columbia's existing modern facilities in California," Mr. Ross stated.

Mr. Fairless in his letter regarding the effect of acquiring facilities at either Fontana or Geneva or both upon the overall steelmaking capacity of the steel corporation, some of which is less efficient than the new plant at Geneva, said:

"We anticipate that such acquisition of these facilities would be accompanied by reductions or displacements in existing capacity so that our basic steelmaking capacity would not be increased in the postwar period."

In view of the recognition both by United States Steel Corp. and Columbia Steel Co. of the importance of west coast markets for steel and these companies' desire for further industrial development in the far west, Mr. Ross concluded, there should be no misunderstanding about their interested attitude toward taking the necessary steps at the proper time to meet the postwar steel needs of these markets.

## Foremen Win Recognition

*Washington*

• • • Grievance machinery to handle disputes between managements and foremen in 12 large war plants, six of them in Detroit, was recommended in a report filed late last week by a special fact-finding panel of the National War Labor Board.

The report stated that complaints of foremen registered during a nine-week hearing last summer in Detroit and the East appeared largely to be well supported. However it was pointed out that where the foreman believed a complaint existed there was obvious need for means of resolving the problem. At Detroit officials of the Foreman's Assn. of America, independent union, whose strikes precipitated the hearings last summer, hailed the decision as evidence that their claims of the necessity of recognition of supervisor problems were justified. There was an evident feeling though that the failure of the tribunal to recommend clear cut means of arbitrating the grievances impaired the finds somewhat. Officers of affected companies went into conferences over the decisions and their reaction seemed to be for the present to take no action until and unless orders from the WLB implemented the recommendations of the panel. It was understood that labor relations people from various Detroit plants would meet this week to discuss the matter further.

## Fontana Not for Sale, Says Kaiser

**Editor, THE IRON AGE:**

**Mr. Fairless of the United States Steel Corp. (or Mr. Ross of Columbia Steel Co.) apparently do not realize that Fontana is not owned by the government. I can understand Mr. Fairless' willingness to discuss with the government an offer to lease or purchase the Geneva plant which is a government owned plant and operated for the account of the government by the Geneva Steel Co., a subsidiary of the U. S. Steel Corp. Mr. Fairless must be confused in offering to the government to purchase or lease Fontana since Fontana is wholly owned by Kaiser Co., Inc. The public should know that my chief concern at the present time is production of the basic materials for war.**

**Approximately one-half of Fontana's production is devoted to shell steel—the other half to steel for ships. My chief concern for the future is employment and I am looking forward to the postwar operation of the Fontana plant and new plants created by its further operation, all of which create further employment. Kaiser Co., Inc. has constructed this plant and invested a large amount of money therein to accomplish the above purposes.**

**(Signed) HENRY J. KAISER.**

# Emerson Findley Dies

• • • Emerson Findley for 27 years Central Western Manager of THE IRON AGE, died on Wednesday, Jan. 31, at Pasadena, Calif., where he had been spending his winters since his retirement from THE IRON AGE in October, 1942. In his capacity as Central Western Manager Mr. Findley was for many years the leading sales representative of THE IRON AGE and his passing will be regretted by his many friends in industry as well as his associates in this company. Mr. Findley came to THE IRON AGE in 1913 as assistant to the general sales manager and was sent to the Middle West territory from the home office in 1915. He graduated from the University of his native Akron, Ohio, where his father the late Dr. Samuel Findley was superintendent of schools. Afterwards he did post graduate work in Latin and Greek at Harvard University. For some years afterwards he taught classical languages at Akron, Ohio; at Worcester, Mass., Academy; at New Haven, Conn., High School and Penn Charter School at Philadelphia. During his long residence in Cleveland, after leaving the educational field to join THE IRON AGE, Mr. Findley became a leading figure in the city's civic and academic circles. He was a member of the University Club, the Cheshire Cheese Club, and Phi Delta Theta Fraternity. He was a long time member of the Epworth Euclid Church. He served as trustee on the boards of the Citizens League, the Phillis Wheatley Association, Baldwin-Wallace College and was a director of the Equity Savings & Loan Co. Besides his wife, the former Genevieve Foote, he is survived by a brother—Edwin L. Findley, retired principal of East High School, Cleveland, and two nieces—Mrs. Charles A. Vogt and Miss Sarah Findley, both of Cleveland.

## New Billet Concrete Bar Orders to Drop In Volume by April

***Pittsburgh***

• • • **Billet producers for concrete** reinforcing bars who have been in Washington for their February production directives found that since their products don't "swim, shoot, or fly" they are merely an annoying blister on the big toe of the war production program. The cuts in billet allotments for concrete reinforcing bars will range between 66 and 80 per cent in April of what they have averaged for the past three or four months.

Concrete bar makers using new billets were told several weeks ago that much of this difference would be accounted for by the elimination of requirements by the Federal Economic Administration and Lend-Lease. Also, WPB indicated that it was withdrawing permission to build many of the structures that have been planned in this country for civilian, service and war production. This planning appears to point out the way in which demands can be trimmed along with supply, but at least one producer this week indicated that FEA apparently had not heard of the decision because it had subsequently increased the pressure for delivery on previously ordered material.

The entire 17,000 tons of concrete reinforcing bars ordered in January for rehabilitation and rebuilding in France were distributed to re-rollers. Re-rollers, however, are having increasing difficulty in obtaining rails. WPB is considering switching bessemer billets to rail re-rollers, and already extensive efforts are being made to divert fence posts and agricultural bars to re-roll in mills.

## Warehouse Control Changed by Order

***Washington***

• • • **WPB announced** recently that filling of orders for stainless steel subject to deferred allotments and the filling of orders to build up warehouse inventories of steel have been prohibited temporarily, under Direction No. 62 to CMP No. 1.

Under the new rules, after Jan. 30, no producer may produce or deliver any stainless steel on orders identified by a CMP allotment symbol the initial letter of which is Z-1, Z1E, Z-2, etc. These are the deferred allotment symbols assigned by WPB in connection with allotments of steel for production of civilian type goods under the spot authorization procedure contained in PR 25.

Similarly, after the same date no producer will be permitted to deliver or produce any steel on orders bearing the CMP allotment symbol placed under direction No. 3 to order M-21-B-1. This symbol has been permitted for use by warehouses in building up their inventories of steel.

## WPB to Shift Concrete Bar Orders to Rail Mills Where Possible

***Washington***

• • • **Rescheduling of directives for** producing reinforcing bars where possible on rerolling mills to absorb any available open capacity has been decided by the WPB Steel Division. This plan was adopted because, as Steel Division spokesmen pointed out, directives for producing reinforcing bars on leading primary steel producers had been cut approximately 50 per cent to allow for production of other urgently needed war requirements.

Under this arrangement, WPB officials told members of the Rail Steel Mill Industry Advisory Committee, orders for steel products that can be made on rerolling mills will be shifted from hot mills wherever possible.

The order shift will not be limited to reinforcing bars, Steel Division officials emphasized. They requested committee members to report all open facilities available for rolling bar shapes and miscellaneous products to ease further the pressure on the primary steel producers.

Lack of rails was cited by the committee as a primary obstacle in expanding rerolling operations. Members reported that a better segregation of scrap would improve the situation, pointing out that many rails now being melted into scrap could be used by the rerolling mills.

# Foreign Briefs . . .

• BRAZIL — Recent reports say of the 25 blast furnaces operating in Brazil during 1943, 19 were in the State of Minas Gerais and four in the State of Rio de Janeiro. When the report was made last year, Brazil had nine rolling mills and 13 rerolling mills, 12 of which were in the State of Sao Paulo. Of the 161 iron foundries mentioned, 122 were in the State of Sao Paulo.

• COLOMBIA — Possibilities for developing an iron and steel plant in Colombia utilizing Paz del Rio iron deposits are causing enthusiasm, according to the *Journal of International Economy*. The site selected is known as Belencito and is centrally located for all consumption centers. Plans are already made for a wide highway leading to the deposits and an extension to the existing railway line may be started soon. Limestone is available nearby. Coke will be brought on from Zipaquira, a 30-year lease on the San Gorge mines having been signed. Electric furnace production of pig iron, as well as iron and steel is contemplated. Products mentioned are: Reinforcing bars, sewer pipe and barbed wire. Production is planned to start at 100 tons a day and eventually reach 200 daily and supply two-fifths of the country's requirements. The economic feasibility of the project is still to be determined.

• ENGLAND — Plate mills are looking for additional orders, shipbuilding needs having been put on a greatly reduced scale. The lack of support from shipbuilders is the main cause for the decline in plate activity since locomotive, wagon and tank manufacturers are placing sizable tonnages. Mills making light structural sizes are still quite active, due to substantial backlogs, according to the *Iron and Coal Trades Review*.

• INDIA—According to Mr. Darab Cursetjee Driver, president, Engineering Association of India, coking coal resources of that country are barely sufficient to last for 50 years at the present rate of consumption and that for this reason no large scale expansion of the Indian iron and steel industry was likely after the war. This statement seems to be at variance with some made by Indian representatives at the International Business Conference in the United States, held recently, who indicated that further steel expansion was in prospect. It may be that the difference of opinion is tied up in the interpretation of the words "large scale." At present India's steel capacity is more than 2,000,000 tons annually.

• SPAIN—The *British Iron and Steel* says production of manganese in Spain in 1943 amounted to 24,027 metric tons compared with 19,698 metric tons in 1942. Output of wolfram in 1943 was 3088 metric tons compared with 1475 metric tons in 1942.

• SWEDEN—Several kinds of iron and steel are being produced for inventory, including 100,000 tons of charcoal pig iron which will be sold when international conditions warrant this action. Meanwhile Sweden's foreign trade in iron and steel has been practically suspended. According to the paper, *Affaersvaerlden*, there is a general desire to step up output to the highest possible levels, but this is impossible due to labor shortages. Scrap iron stocks are said to be abnormally low, while coke and charcoal appear to be in satisfactory supply. Foundries are reported to have good stocks of pig iron and those authorities in charge of storing essential goods are busy collecting all pig iron available in the market. Swedish shipyards are reported to be obtaining larger tonnages of plates, particularly from the Domnarfvet works which has a large modern plate mill. The Bofors concern has disclosed plans for the erection of a large new iron works estimated to cost 25,000,000 kroner.

## *Federal Deficits Held Unnecessary to Absorb "Excessive" Savings*

***New York***

• • • **Both national income and employment will be on considerably lower levels in the postwar years than is indicated by widely publicized official and unofficial forecasts, according to Rufus S. Tucker, economist of the General Motors Corp., who finds that current estimates of postwar national income are based on "incorrect accounting and economic theories" and contain cumulative errors at nearly every step in their calculation.**

Dr. Tucker, writing for the National Industrial Conference Board *Record*, calls attention to three basic errors in the forecasts. The first is that they assume a larger labor force than will exist; second, they assume too low an estimate of unavoidable unemployment; and third, they assume a greater annual increase in output per worker than can be supported by the evidence of past experience.

"Over seven million workers," says Dr. Tucker, "are now employed who would not have sought work if it had not been for the war. Nearly all the men in this emergency labor force will retire from it as soon as the emergency is over, and most of the women as soon as the men in uniform get home. The number of emergency workers remaining in the regular labor force by 1950, other than the boys and girls who would normally have entered it anyway in a few years, will barely exceed the number of war casualties. The total number of persons working or looking for work in 1950 will probably be under 58.5 million, if the nation is peaceful and prosperous, and after deducting the Armed Forces (2 million) and the minimum amount of frictional unemployment there will probably be fewer than 53.5 million civilian workers.

As to productivity, Dr. Tucker says: "Output per full-time worker normally increases from year to year, but the peacetime rate of increase for the whole of the economy does not appear to have been over 1.4 per cent a year except when a previous loss was being made up."

The high estimates of postwar national income reached by the Department of Commerce are based to a considerable extent upon its placing the increase in worker output at 2½ per cent a year. Of this Dr. Tucker says:

"The Department of Commerce assumes an increase in labor productivity amounting to 2½ per cent per man hour per year, which is alleged to be based on the experience of 1929-1941. But this calculation is fallacious, for several reasons. The department's estimates of gross national product since 1940 have been too high for a fair comparison with earlier years, or with future peacetime years. They have counted business taxes twice, once as embodied in the prices of finished goods, and again as an addition to net national income. The department has also put down governmental services as being worth what they cost and disregarded the fact that government services do not have to be marketed, and that if they could be valued at what the involuntary consumers have to pay for them many would be valued at less than their cost."

Dr. Tucker's own estimate of the national income for 1945-1950, which he terms "optimistic," forecasts sharp declines through 1947, then a gradual rise through 1950.

Summarizing he said, "Assuming that the war is entirely over by the end of 1945 and that there will be continuously high employment after 1946, a projection of the trends of the last 40 years indicates that the net national income in money of prewar purchasing power, will be slightly less than $100 billion in the years 1947 to 1950. The gross national product, as defined by the Department of Commerce, will be slightly over $120 billion in those years. If expressed in dollars of 1943 purchasing power these figures would be $125 billion and, 150 billion, respectively."

## Ferroalloy Producer Drops Simanal Price

***Canton, Ohio***

• • • **A reduction in the price of Simanal, a ferroalloy containing 20 per cent each of silicon, manganese and aluminum, balance iron, has been announced by the Ohio Ferro-Alloys Corp., Canton, Ohio.**

**Effective Jan. 1, 1945, carload lots will sell at 8c. per lb., ton lots at 8.75c. per lb. and less than ton lots at 9.25c. per lb. fob. Philo, Ohio. Freight will be allowed to destinations as far as St. Louis, or the equivalent rate on longer hauls. This action represents a drop of 0.75c. per lb. in carload lots and 0.50c. per lb. in ton lots.**

# Industrial Briefs . . .

• LINK-BELT MOVES—Link-Belt Co. has moved its Huntington, W. Va., office from 2840 North Staunton Road to Suite 1301-02, West Virginia Building, Fourth Avenue and Ninth Street.

• BUYS COMPANY — Gerotor May Corp., Baltimore, has purchased the Cotner Machine Products Co., Logansport, Ind., manufacturers of a complete line of air and hydraulic equipment for machine tools and other industrial applications.

• ARMY CONTRACT — Rheem Mfg. Co. has been awarded a contract by the Army to machine 4.2 in. steel mortar shells for chemical warfare use. The shells will be produced at Houston, Tex., where new buildings will be erected by DPC on 200,000 sq. ft. of space. Production is scheduled to begin in May. Also DPC is leasing a large building in Brooklyn, to Rheem which will utilize it to forge and machine 75 mm. steel shells.

• HIGHEST HONOR — The Gold Medal of the American Institute of Chemists was recently awarded to John W. Thomas, chairman of the Firestone Tire & Rubber Co. and directing head of its world-wide operations. The medal was given in recognition of the leadership of Mr. Thomas in rubber research for four decades, and for achievements under his direction in the development and production of synthetic rubber.

• APPOINTS COUNSEL — Industrial Steels, Inc., and its subsidiary, Stainless Surface Hardening Co., both of Cambridge Mass., have announced the appointment of the John Mather Lupton Co., New York, as advertising and marketing counsel.

• BUYS PIPE COMPANY — The Duraloy Co., Scottdale, Pa., has announced the purchase from the U. S. Pipe & Foundry Co., Burlington, N. J., of its interest in the Duraloy Co.

• LISTS WAR AGENCIES—Fifty-four separate war agencies having offices in Chicago are listed in a directory just revised by the war problems service department of the Chicago Association of Commerce. War problems and controls with which each agency deals and the names of key personnel are included.

• RECORD BREAKERS—The men and women of American Steel & Wire Co., U. S. Steel subsidiary have broken 435 production records during the year 1944. This brings the number of records smashed since Pearl Harbor to 2289.

• WASHINGTON—The War Department has announced the authorization of $1,500,000 for the construction of increased capacity at the Buckeye Ordnance Works, Ironton, Ohio. Work will be supervised by the Huntington, W. Va., district office of the Corps of Engineers.

• TO SELL FORGINGS—The Wyndale Mfg. Corp., Indianapolis, has made arrangements for the manufacture and sale of Wyndaloy-Chace 720 forgings. The new material will be available in the as forged condition or as forged and heat treated or as forged, machined and heat treated.

• WELDING COMPANY — Precision Welder & Machine Co., Cincinnati, has been formed by T. Embury Jones and E. W. Forkner, both of Federal Machine & Welder Co., Warren, Ohio. The new company will build a complete line of spot, projection, seam and flash butt welding equipment.

• ELECTED MEMBER—James A. Marohn, controller of the Ohio Injector Co., Wadsworth, Ohio, has been elected to membership in the Controllers Institute of America.

• CONSTRUCTION MIRACLE—What is considered almost a miracle is the construction of two battery assembly lines in the former hangars at Mitchell Field, Milwaukee, for the Signal Battery Co. in two weeks' time for the use of German prisoners of war.

# WPB Scrap Zoning Plan Seen Opposed by Dealers and Consumers

*Pittsburgh*

• • • The attempts of the WPB scrap division to set up a zoning system for supplying steel mills with scrap, in lieu of the springboard that was abolished by the OPA last November, are apparently meeting with opposition from both the dealers and the consumers. There have been several angles to the zoning plan that tend to disrupt the trade rather than straighen out matters, and, in addition, because the springboard system worked well for the past three years, the thinking is that it should be re-established.

Members of the trade here are trying to understand why the zoning system was ever proposed, and have come to the conclusion that it is the result of an inter-bureau dispute between the OPA and the WPB. Since the re-establishment of the springboard would be a comparatively simple matter, and the zoning system would be something entirely new, requiring time to set up and get into operation, the feeling here is that the trade is being made the scapegoat of another Washington wrangle.

One of the chief reasons for setting up the zoning system is to eliminate cross-hauling on already overloaded railroads, caused by the elimination of the springboard which permits the consumer to pay any amount of freight on scrap. Mills here point out that even under these circumstances they will not draw scrap from points farther than necessary, and even with the springboard, when conditions got critical the WPB would allocate scrap from practically any point in the country.

One place it is said where the zoning system would work a hardship as it is now proposed concerns scrap produced along the lakes. Pittsburgh normally draws scrap from Detroit, and some of the lake cities such as Cleveland and Buffalo draw scrap from upper lake areas. This would be eliminated entirely it is said. It is quite conceivable that there might be a severe scrap shortage in Pittsburgh, while the price actually is breaking in Detroit. This would result if the supply of scrap is greater than the demand by the areas that draw from Detroit.

The letter sent out by the WPB to mills asked for an opinion concerning the plan by Feb. 1, or WPB would consider that the mill approved the plan. While this undoubtedly got quicker action from the mill than if no deadline were set, the lack of an answer could under no circumstances be interpreted to mean that the mill either approved or opposed the proposed plan.

## WPB Penalizes Dealer In Rail Equipment

*New York*

• • • M. K. Frank, 480 Lexington Ave., New York, a dealer in relay rail and track equipment, delivered 7,182,759 lb. of used rail and 10,497 pairs of rail joints between April, 1942, and July, 1943, in violation of WPB regulations, the Compliance Division of WPB has announced.

WPB directed Frank not to sell, transfer or dispose of any used rail of reroll or scrap grade during the next three months. Frank is charged with violating order L-88, which restricts disposition of used rails and rail joints. Frank failed to keep accurate records concerning inventories, purchases and sales of used rail; he also failed to file monthly inventory reports with WPB, as required by that order, Compliance Division officials said.

GERMAN AUTOMATIC RIFLE: *U. S. soldier holds an F.G. 42 German 7.9 mm. automatic rifle used by German Paratroopers who were captured near St. Lo, France.*

## Republic Steel Corp. Earnings Off in 1944

*Cleveland*

• • • Republic Steel Corp. reports consolidated net income for 1944, after all deductions including provision for federal income and excess profits taxes, totaled $10,130,296, compared with $12,011,057 for 1943.

Earnings for 1944 were at the rate of $1.44 per share of common stock, as compared with $1.77 for 1943.

Provision for federal income and excess profits taxes in 1944 was $31,400,000 compared to $39,300,000 in 1943.

Republic's 1944 sales amounted to $531,235,000 compared with $552,329,000 in 1943, and the rate of production in 1944 was 99.8 per cent compared with 100.4 per cent in 1943.

Earnings of the corporation for 1944 after deduction of non-recurring expenses amounting to $4,483,000 (covering discount and expense, call premium and interest on bonds and notes retired) in connection with the refunding of its debt involving the issuance in May, 1944, of $50,000,000 First Mortgage 3½ per cent Bonds and $24,500,000 2¼ per cent Serial Notes.

The corporation has made provision in its 1944 accounts for estimated liability for retroactive wages under the directive order of the National War Labor Board.

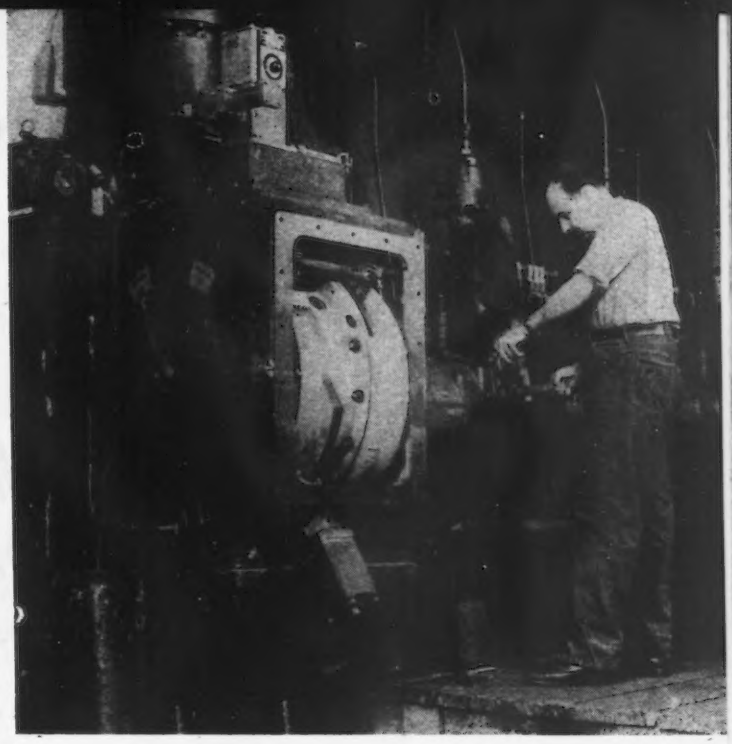
## Zoning Plan Repudiated

*New York*

• • • It is reported that a meeting was held in Washington between representatives of the steel mills and the scrap industry in order to consider the zoning plan for limiting shipments of scrap out of production areas. The WPB was represented at this meeting but there was no representative of OPA present, according to reports.

Sentiment of the meeting on the part of both groups was in definite opposition to the zoning plan and it seems that this proposal is not likely to be revived. When a recommendation was made that the springboard limitation on transportation costs be reinstituted in order to prevent cross-hauling, it is said that representatives of WPB made no further comment as the OPA would be likely to supervise such a regulation once again.

# U. S. Training Course For South Americans Successful



SCHOLARSHIP RECIPIENT: *Senor Alberto Lores, of Peru recipient of an Inter-American Trade Scholarship award, sponsored by the Coordinator of Inter-American Affairs, is shown receiving on-the-job training in diesel engine construction and operation with the Nordberg Mfg. Co., Milwaukee.*

o o o

*Washington*

• • • Since 1941 training programs sponsored jointly by government and industry have made available to about 150 ambitious young men of the other Americas practical training in the United States, with private concerns, in industrial, business, agricultural and mining methods. These young men work with American workmen and learn by doing.

Reports from returned trainees testify to the value of this industrial training. The results have proved so favorable that an independent, nonprofit membership corporation, known as the International Training Administration, Inc., has been set up to operate on a world-wide basis.

The directors of this corporation feel that this program is of definite value to the United States because it stimulates the desire for United States products, which the trainees become familiar with during their stay in this country. In addition, foreign technicians trained in the United States are better qualified to service American machinery and equipment for branches of United States companies abroad.

The story of the I.T.A. goes back to 1941. With the defense program getting underway, normal international trade was practically brought to a standstill, and the bringing of young men here from other nations for practical, technical and professional training had virtually ceased.

The war in Europe presented a unique opportunity to bring to this country a larger number of young men for training, for previously most of these men had been trained in Europe. The war had closed Europe to them.

Certain business groups recognized the value of such a training program and gave their full cooperation to the then Coordinator of Inter-American Affairs, Nelson A. Rockefeller, when he suggested that an inter-American industrial training program be initiated by the United States government in cooperation with private industry.

The Inter-American Trade Scholarship program was set up in August, 1941. Under this program, approximately 150 young men have come here from the other Americas. Their travel and living expenses while in Washington undergoing orientation and while writing their final reports, are paid by the Office of Inter-American Affairs. During the time they are being trained by industry, the trainees receive an average of $150 a month as a living allowance in lieu of compensation.

Transportation, housing accommodations, visas, customs, censorship, certificates of compliance, clearances and other travel requisites are centered in the I.T.A. Insurance coverage for accident and medical reimbursement is provided under a blanket policy, from point of departure to return. Certain tax exemptions have been allowed by the Bureau of Internal Revenue, with regard to formalized training programs under the auspices of the I.T.A. The living allowance paid to individuals undergoing training is exempt from Federal income and employment taxes. Furthermore, such amounts are deductible as operating expense.

Mr. Elliott Hanson, who has had much experience in the export field, was placed in charge of the training organization and he has since become president of the I.T.A. Candidates are selected by a Trainee Selection Committee established in each of the 20 other American Republics. These committees serve without compensation, and are composed, in practically all instances, of a representative of United States industry in the respective country, the chairman of the country's commission of Inter-American development, and a technical specialist of the trainee's own country.

For placement with industry in the United States a placement advisory committee of government officials and businessmen was appointed. Through the National Foreign Trade Council, industry as a whole was approached to support the program. Of the 397 companies that were asked if they could cooperate by taking one of the Inter-American Trade Scholarship award winners for training, 92 per cent responded in the affirmative. Federal, state and municipal agencies likewise agreed to assist. To date, more than 200 private enterprises, labor unions and government departments have been willing and able to contribute actively to the training of these young men.

The selected trainees receive a period of on-the-job experience in the particular trade or career they have chosen. In announcing the program of scholarship awards emphasis was laid upon the fact that candidates would be expected to do manual labor and on an equal basis with young North Americans receiving the same training. This did not diminish the number of applicants for the awards. For example, to the amazement of the trainee selection committee in Ecuador, more than 400 young men applied on the first day the awards were announced, although the committee had planned to make only two awards. Applications had been invited from young men between 18 and 20 years of age who were able to pass a physical examination and who possessed a

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**Roustabout saves you time and money on these and many other jobs**

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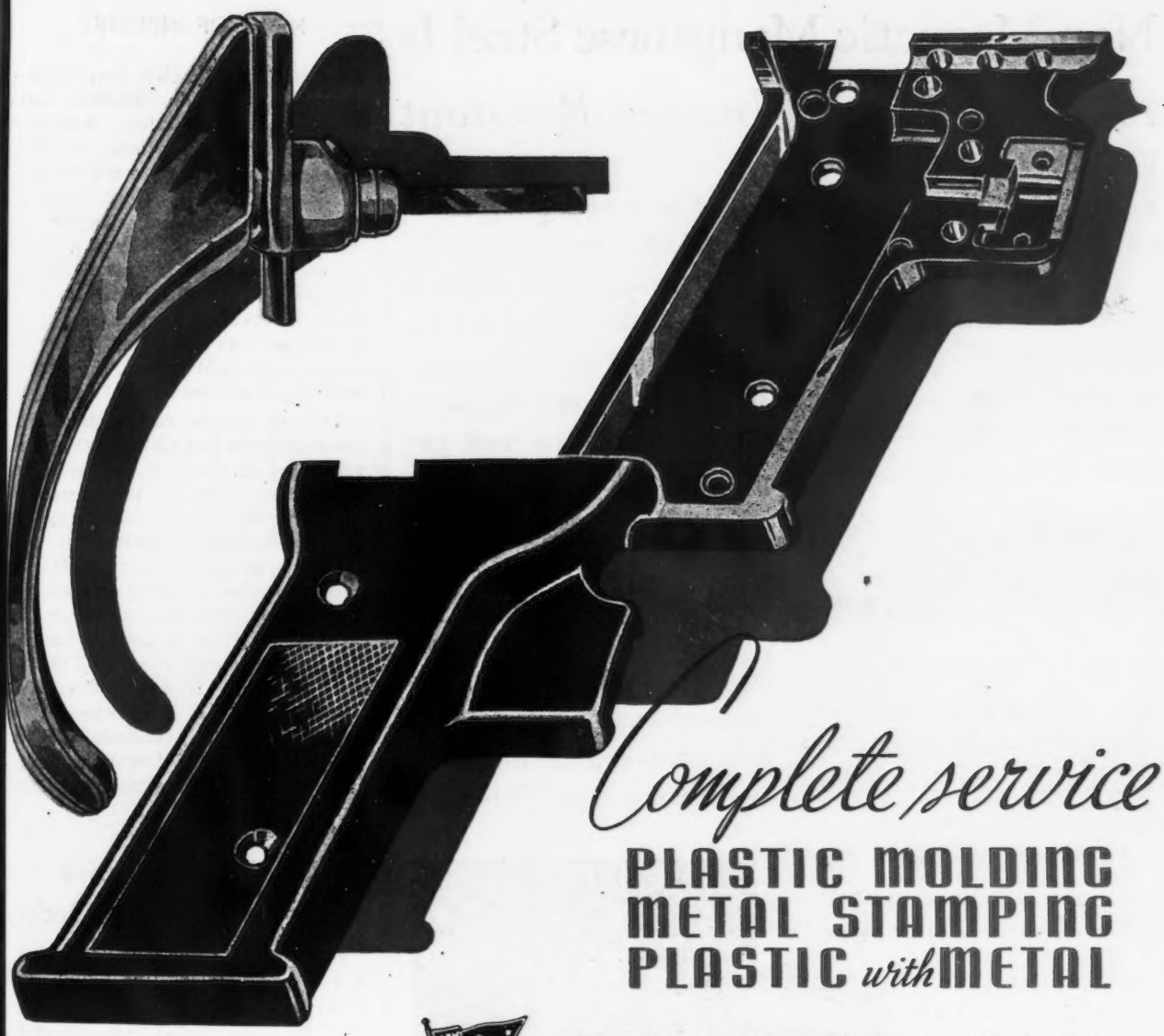
good working knowledge of English. Many were unable to meet the language qualifications. However, as a result of the interest created, 80 otherwise qualified Ecuadorans began the study of English so that they might qualify for the awards.

Under the program, care is taken that training projects selected will ultimately be of benefit to the trainee's own nation. Each country's requirements for trained technicians are studied by the Trainee Selection Committee. The staff in Washington then arranges the specific type of training for the candidate to fit these needs.

In June, 1943, the Inter-American Training Administration was transferred from the Office of Inter-American Affairs to the Inter-American Development Commission, parent body of national commissions of Inter-American development in the 21 American Republics. Meanwhile, the Inter-American Training Administration began to receive requests from business and government groups that the scope of its services be expanded to function on a world-wide basis and be made available for programs relating to postwar plans.

To obtain a reliable index with regard to the reactions of United States businessmen to the training program, the National Foreign Trade Council, in October, 1943, was asked to initiate an inquiry to its membership. The Council reported that it is the unanimous opinion of its Education Committee that the work of the training administration could most effectively be carried on by an independent non-profit membership corporation, recognized by the United States government, but having on its board businessmen interested in this particular type of vocational education.

With the approval and cooperation of the Inter-American Development Commission and the Office of Inter-American Affairs, the staff facilities and commitments of the Inter-American Training Administration were converted into a non-profit membership corporation under the laws of the State of Delaware, with the name International Training Administration, Inc., having headquarters in Washington. A board of directors representing government, management and labor was elected. They are William L. Batt, vice-chairman, WPB; William A. M. Burden, Assistant Secretary of Commerce; James B. Carey, secretary-treasurer, CIO; James S. Carson, vice-president, American & Foreign Power Co.; Harrison Jones,



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PLASTIC HANDLES. injection molded. Industrial applications. Injection up to 18 oz. per shot.

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**OUR PLASTIC DIVISION . . . furnishes custom molding in all thermoplastics from a fraction of an ounce up to 18 ounces per shot.**

**OUR METAL DIVISION . . . fabricates in all heavy and new light metals. Drawing, Coining, Stamping, Welding, Rolling, Forming.**

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# Non-Magnetic Manganese Steel Is Also *Shock and Abrasion Resistant*

There are other non-magnetic metals, but where resistance to shock stresses and abrasion is essential, as well as non-magnetism, 10-14% manganese steel is often chosen. This steel is almost completely non-magnetic, having a permeability of

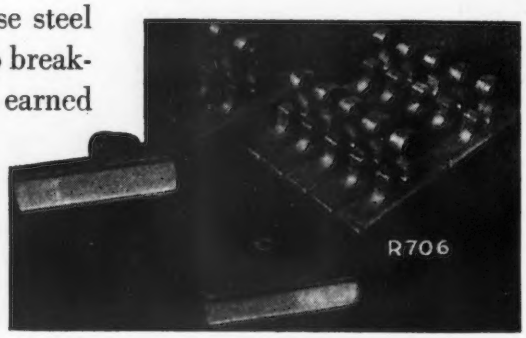
about 1.3 without surface preparation. Its price is lower than alloys with comparable properties unless extensive machining is required.

Austenitic manganese steel has a high resistance to breakage stresses, which has earned its title of "The Toughest Steel Known." It work-hardens on the surface under repeated blows, a phenomenon by which its abrasion resistance is increased in service.

The pictures show some of the non-magnetic uses to which manganese steel castings have been applied.

R-380. Bottom plate or coil shield for a lifting magnet. It is subjected to heavy shocks when the magnet is dropped onto the pile to level out the material, and when the powerful current causes rising pieces to strike the plate with tremendous blows. Manganese steel cover plates are used on all makes of industrial lifting magnets.

R-706. Collector shoes for overhead traveling cranes are made of manganese steel not only for its extreme toughness and wear resistance, but because its non-magnetic property assures ready release from the rail.




Send for Bulletin 1144-NM, which pictures other non-magnetic applications for manganese steel.

**Long lasting, wear resistant gears, sprockets, sheaves, wheels and rollers of manganese steel are described in Bulletin 842-WS.**

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FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
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chairman of Coca-Cola Co.; Julius Buhrsen, secretary, Railway Lab Executives Association; Robert Lynch, special assistant on boa management matters to the Secreta of State; Clark H. Minor, presiden International General Electric Co John C. McClintock, former assista Coordinator of Inter-America Affairs; Charles P. McCormick, pres dent, McCormick & Co.; Joseph Rovensky, vice-president, Chase Na tional Bank; and Robert J. Watt, i ternational representative, AFL.

Looking to the future, the I.T.A seeks to foster and assist internation programs of practical, technical an professional training programs con ducted in the United States, by for eign or domestic organizations, gov ernments, private enterprises, founda tions and others. Being essentially service-type institution to handle de tails of training, it neither finance programs nor does it provide the ac tual training. However, the I.T.A does feel that it integrates in on organization such standards and ser vices as are essential to the success ful conduct of international trainin programs.

## *Curtiss Receives More Cargo Airplane Orders*

***Buffalo***

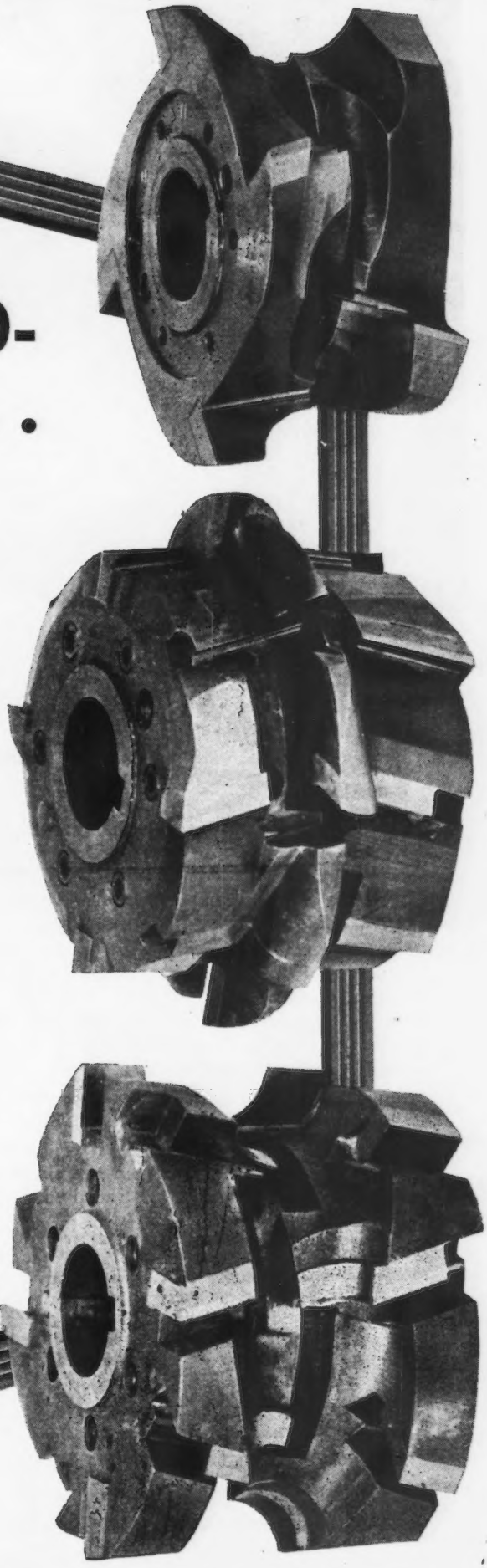
• • • Army orders which will mea a 50 per cent increase in productio of C-46 (Commando) cargo-carryin airplanes from June to the end of thi year have been received by the Buf falo and Kenmore plants of the Cur tiss-Wright Corp. Airplane Division.

Announcement was made by N. F Vanderlipp, general manager of the Curtiss Buffalo plant, and John J. Lee general manager of the Kenmore plant, in a joint statement. The in crease, they said, "is over and above present production schedules."

The new contract, they pointed out extends orders for the C-46 beyond the middle of 1946 and will call for 33 1/3 per cent greater production next year than had been originally scheduled.

Although most of the C-46 produc tion increase will be handled by the Buffalo and Kenmore plants, it is not expected that additional workers will be required, except for a few skilled mechanics. A small part of the Army's increased order for the twin-engine transports will be absorbed by the St. Louis factory of Curtiss.

# *What* "TOOL-ENGINEERED-TO-THE-JOB"..... *Can Mean to You*



Thompson Products quick-disconnect couplings make it possible for an aircraft engine to be pulled and replaced in the least possible time. They keep planes in the air—and that *counts.*

Simple as these couplings are to handle in the field, they are difficult to produce. Genesee had the confidence and ability to make the kind of form-milling cutters Thompson needed to machine these parts. Castings of an abrasive aluminum alloy had to be held to tolerances measured in tenths of thousandths at points where the wall was very thin and which offered little support to the action of the cut.

At the time Genesee was asked to collaborate on a new milling cutter design, this operation was a very expensive "bottleneck". Thompson engineers had an idea for improving the cutter design and asked Genesee to help. Thompson found them "willing and capable of helping in engineering matters and in making these cutters." Today, **"TOMAHAWK"** ground profile relieved cutters are turning out 2-½ to 3 times the number of pieces per grind.

In the battles for output and cost, you may be able to approach—but you can't beat **"TOMAHAWK"** engineered-to-the-job tools. Why not talk over *your* tool requirements with a Genesee Field Engineer? There is one near you.

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THERE'S MORE TO A SHACKLE THAN SIZE AND TYPE

• It takes more engineering than you might think to make really good shackles. We know, because we've been making good shackles for years. And, every once in a while, we find a way to make them even better.

ACCO SHACKLES are forged from fine grain steel which has superior forging qualities—a steel which can be depended upon for uniform product with uniform tensile strength.

All ACCO SHACKLES are forged in solid dies. Most sizes are drop-forged already bent. This also insures greater uniformity.

Every shackle is rigidly inspected. Special lights enable inspectors to see even the smallest defect. It is almost impossible for a faulty shackle to get by ACCO inspectors.

In shackles with a screw pin, the pin is drop-forged and accurately threaded for continued easy operation.

ACCO SHACKLES, are made to do their job—better.

ACCO SHACKLES are made in both chain and anchor type—of material from ¼ inch to 2 inches—with round pin or screw pin—finished self-colored, blacked or galvanized—shipped in kegs or barrels, depending on quantity.

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## *Soviet Wartime Ore Supply Is Restored By Urals Expansion*

*New York*

• • • **The Soviet iron ore** industry was among those which suffered most from war and enemy occupation. According to the latest data published before the war, nearly 70 per cent of all the industrial deposits of iron ore were concentrated in the occupied districts or in districts situated close to the front line

Before the war the Krivoi Rog basin in the Ukraine accounted for nearly 62 per cent and the Kerch deposits in the Crimea and those of the central regions for 8 per cent of the total output of iron ore. This output corresponded approximately to the ratio of industrial deposits of iron ore in various districts. The eastern districts which were not affected by military operations, yielded about 30 per cent of the iron ore.

The Krivoi Rog iron ore districts with an annual output of about 20 million tons of ore, was first to be put out of commission as a result of German occupation. This is also true for the metallurgical industry of the Dnieper region with a capacity in production of pig-iron and steel which equalled that of the iron and steel industry of the Donbas. The Red Army at that time still held the Donbas and Azov districts.

The realization that the iron and steel plants of these districts would have to continue without their Krivoi Rog iron ore base for a long time induced the authorities in the Autumn of 1941 to work out a technical plan for the mobilization of the resources of the iron ore industry of the Urals so as to obtain a surplus (the above amounts were necessary to meet the needs of the iron and steel industry of the Urals and Siberia) to supply the remaining plants of the south.

This plan also provided for an extensive utilization of blended iron ore and also of considerable supplies of blast furnace dust accumulated at the southern plants. It called for a rapid increase in the output of ore in all mines of the Urals and Eastern Siberia (Shoria Highlands to the southeast of the Kumetsk basing). This was to be accomplished with the aid of a considerable amount of mining machinery evacuated to the east from Krivoi Rog basin.

At the beginning of the war these mines had the most up-to-date equip-

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**In addition, KAYDON offers added services in flame hardening, precision heat treating, metallurgical laboratories, microscopy and physical testing.**

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*New in Name . . . Old in Experience*

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HANDLING—the Common Denominator of PRODUCTION

LET MEN DIRECT POWER—NOT GENERATE IT!

**Only three kinds** of work are done on anything: processing, assembling, handling. No production, storage, transportation or delivery of goods can proceed without handling. You can't take it for granted if you're out to get production.

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ment. The drilling was completely mechanized by pneumatic methods. Electric locomotives were used for underground transportation. The delivery of ore was mechanized in all mines. Electric and gasoline engines were used for surface transportation. The loading of ore was 90 per cent mechanized. The mines were equipped with powerful crushing and grading equipment.

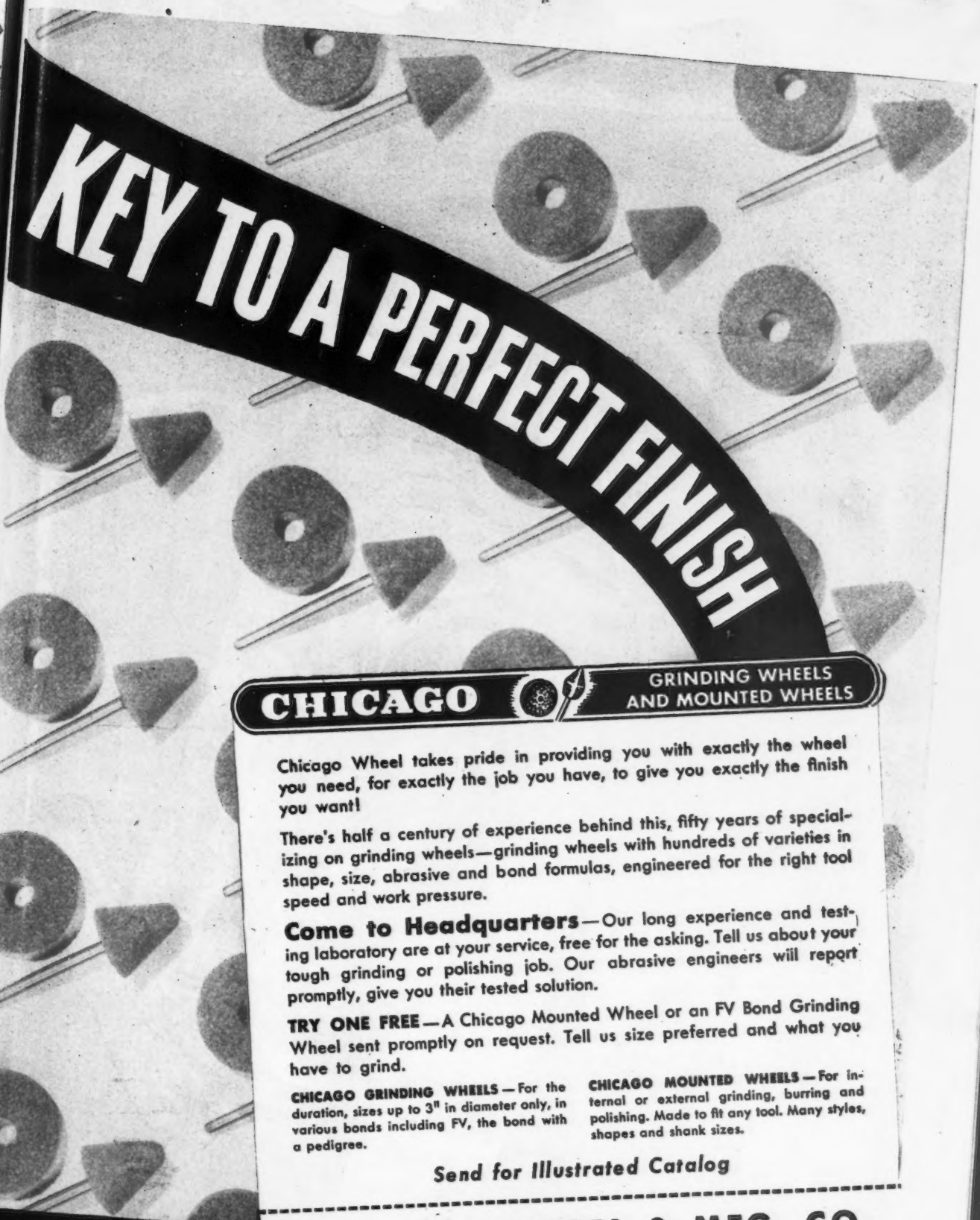
A considerable portion of this first-rate equipment was evacuated to the Urals and other mining districts in the east. This enabled the mining industry to achieve a rapid increase in output of ore in a number of big mining enterprises of the east.

• • • This plan for the supply of Ural ores to the iron and steel mills of the Donbas was not put into effect because of further invasions of the German army, which soon seized the Donbas and Azov region; but the technical measures which were the keynote of this plan had to be realized just the same in connection with decisions taken to increase the capacity of the iron and steel industry in the east.

Since 1941 the Urals became the principal iron ore base of the U.S.S.R. Concentrated there, is up to 90 per cent of the total wartime output of iron ore. The Urals supply ore not only to their own iron and steel industry, but also to that of other districts in the east. The iron and steel industry of western Siberia founded during the period 1930 to 1936 likewise receives 70 to 80 per cent of its ore from the Urals.

The Urals have a rich and varied assortment of iron ores. Of some 1200 iron ore deposits discovered there, only about 200 are listed as suitable for industrial use. The majority of these deposits are distinguished by their complicated structure and mineralogical composition, and demand a preliminary processing for their most economic use in the blast furnaces.

There are ores distinguished by their exceptional purity; free from harmful impurities, they represent a natural base for the production of high-grade metal, especially through charcoal smelting of pig-iron, which is fully ensured by rich ore resources. Many iron ores also contain nickel, chromium, manganese, cobalt, vanadium, titanium and copper. All these specific features of the Ural ores were simply ignored in Tsarist Russia; pure high-grade ore was used for ordinary

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Chicago Wheel takes pride in providing you with exactly the wheel you need, for exactly the job you have, to give you exactly the finish you want!

There's half a century of experience behind this, fifty years of specializing on grinding wheels—grinding wheels with hundreds of varieties in shape, size, abrasive and bond formulas, engineered for the right tool speed and work pressure.

**Come to Headquarters**—Our long experience and testing laboratory are at your service, free for the asking. Tell us about your tough grinding or polishing job. Our abrasive engineers will report promptly, give you their tested solution.

**TRY ONE FREE**—A Chicago Mounted Wheel or an FV Bond Grinding Wheel sent promptly on request. Tell us size preferred and what you have to grind.

**CHICAGO GRINDING WHEELS**—For the duration, sizes up to 3" in diameter only, in various bonds including FV, the bond with a pedigree.

**CHICAGO MOUNTED WHEELS**—For internal or external grinding, burring and polishing. Made to fit any tool. Many styles, shapes and shank sizes.

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Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive industry.

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Until recently, rust has been accepted as a necessary evil in many operations.

Today, thanks to new developments, various types of rust-preventive coatings and lubricating oils are obtainable.

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As protection against rain and snow during outdoor storage, or high humidity conditions *inside*, Shell offers a complete line of Shell Ensis Rust-Preventives. These oils, fluids, and compounds come in various grades, each designed to meet a specific condition. Protective coatings range from thin transparent coverings that need not be removed, to coatings that are able to resist extremes of weather over long periods of time.

### SHELL TELLUS RUST-PREVENTIVE LUBRICATING OILS

Where moisture is a factor, Shell Tellus Oils are recommended for machine lubrication. These scientifically developed oils cannot *remove* rust once it has started. But, because of special built-in rust inhibitors, they afford protection against the formation of rust—this without loss of lubrication qualities.

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types of metal, while the presence of alloy ingredients was considered a liability rather than an asset.

The iron-ore industry of the Urals now represents a very complicated branch, employing highly skilled specialists in geological prospecting and ore beneficiation. The iron and steel industry of the Urals now smelts various high grade pig iron varieties such as charcoal, pig iron and chromium, vanadium and nickel bearing alloys.

The war has greatly accelerated the development of the iron ore base in the Urals. The first demand of the war, especially in connection with the loss of southern coal and metal base, was naturally to increase the production of metal. With this aim in view, despite wartime difficulties, large scale construction was immediately launched of new blast furnaces, steel foundries, rolling mills and shops in existing enterprises as well as the construction of new plants. But the most rapid construction nevertheless demanded time, and therefore special attention had to be paid to increasing the capacity of the existing iron and steel mills.

One of the important requisites for increasing the productivity of blast furnaces is the improvement in the quality of raw materials, use of ores with a higher content of iron, crushed and graded, freed from all fines, the latter being utilized for agglomeration and briquetting. From the very first months of war the iron ore industry of the Urals had to live up to these demands, at the same time conducting preparations for increasing the output of ore to supply the newly built blast furnaces.

• • • For a short period it was expedient to increase the output of iron ores on sections with a higher content of iron, and temporarily to withhold from use ores with a leaner iron content, which could not at the time undergo beneficiation. These ores were accumulated for concentration and utilization in blast furnace smelting after the war. The same principle had to be adhered to with regard to fine ores, where the capacity of agglomerating plants was inadequate for consuming all fines.

In these circumstances the expansion of concentration and agglomeration plants became of special significance for the Ural iron ore industry. The development of this process proceeds in accordance with the receipt of the necessary equipment.

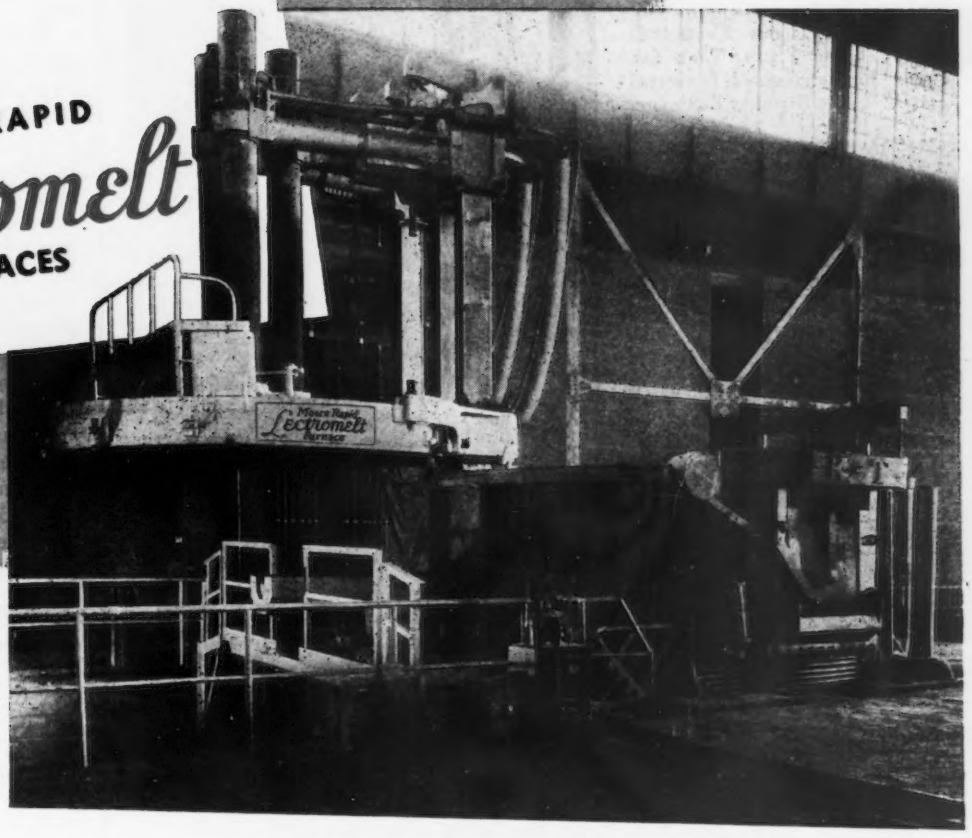
A characteristic feature of the iron ore industry of the U.S.S.R. during

# for SIMPLIFIED OPERATION

MOORE RAPID

# Lectromelt

FURNACES



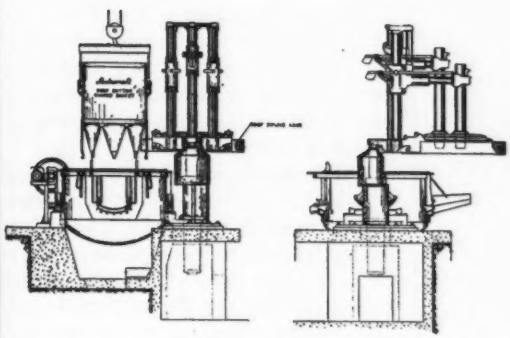

*A size "KT" Lectromelt, for pouring 40 to 50 ton heats, is shown with the roof rotated, ready to be charged by a drop bottom bucket.*

*The roof lifting apparatus as standard is stationary and separate from the furnace shell.*

★ The advantage of top-charging and other exclusive design features of Lectromelt furnaces permit greater production in the melting of quality steels and irons.

Lectromelt top-charge furnaces are rugged in design and use a minimum of parts in the operation of the roof.

The furnace roof is hydraulically raised and swung aside by the operator moving one valve. On the larger capacity furnaces the tilting mechanism is hydraulically operated, while on the smaller sizes it is operated either by electric motor or by manual operation.



Top-charging by means of drop bottom bucket offers the following advantages to Lectromelt users:

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REDUCED ELECTRODE CONSUMPTION
REDUCED REFRACTORY COSTS
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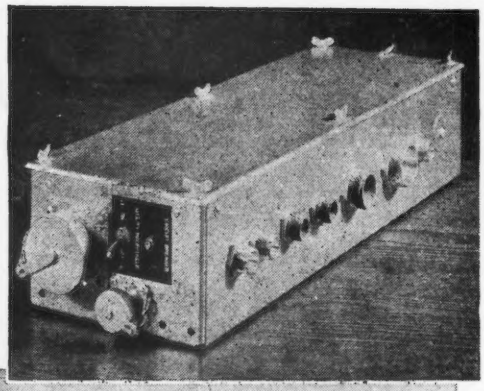

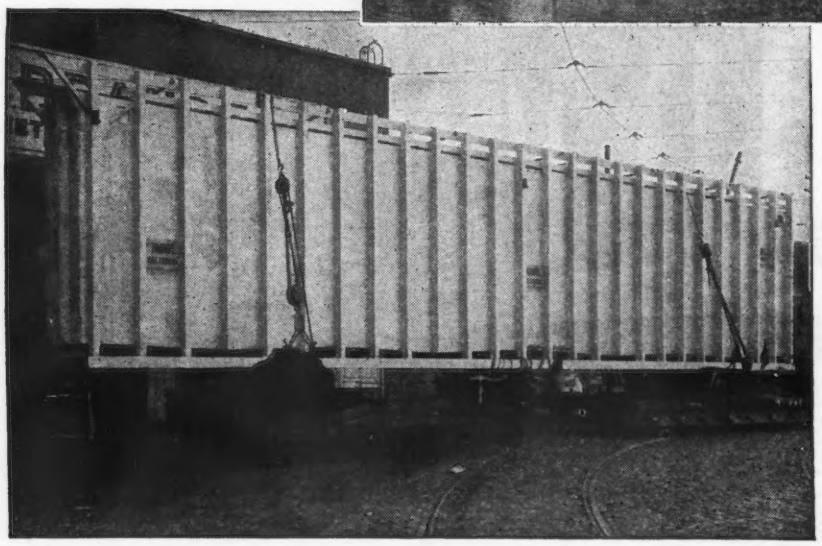

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the war years is also the great predominance of surface mining, whereas before the war the principal rôle was played by the Krivoi Rog basin with its underground methods. Surface mining is practiced on a large scale also in other districts of the Ural.

The amount of ore mined per cu. meter of excavator capacity was about 58 cu. meters in one working hour, or about 290,000 tons of ore annually. Other big iron ore enterprises have a far lower average than Mount Magnitnaya, because of the more complicated nature of deposits and the necessity for separate mining of the different varieties of ores.

Apart from the above-mentioned general tasks facing the iron-ore industry as a whole, some mining districts were called upon to solve a number of local tasks which were of tremendous importance. For example, the ore industry of northern Urals was confronted with the task of mining pure iron ore for charcoal smelting, to eliminate the necessity of hauling such ores from the southern

*See* THE IRON AGE, *Nov. 16, 1944, p. 103.*

Urals. In the Tagil area it was necessary to organize the mining of bessemer ores on a large scale in connection with the reassembly of the large bessemer shop evacuated from occupied territory. Prior to the war the Urals had no bessemer production, and the iron ore industry of the Tagil district had no selective mining of ores with small content of phosphates or fine grain ore, suitable for smelting bessemer pig iron. The Bakal ore district continued to supply pure ores for charcoal pig iron, and during the last year it considerably increased output of ore for new mills recently stated in Chelyabinsk.

The Magnitogorsk mines which represented one of the biggest enterprises of this kind in the world, stepped up output of ore to such proportions as to be able at present fully to satisfy the demand of the Magnitogorsk steel mills, which increased by 60 per cent, and to supply the Kuznetsk steel mill in western Siberia, whose own iron ore mine meets only one-third of its demand for ore.

An idea of the scope of iron ore mining in the Urals may be gained from the fact that the capacity of local blast furnaces increased by approximately 70 per cent during the war, and that their total demands are met by Ural ore, not counting its supply to Kuznetsk. Furthermore, preparations are under way in the iron ore

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base of the Urals, for a further increase in output to provide ore for new blast furnaces under construction at Magnitogorsk, Chelyabinsk, Novo-Tagil and Orsk plants.

The iron ore industry of the Urals differs from that of all other ore mining districts of the U.S.S.R., and the majority of other countries, in that iron chromium and nickel ores are used for smelting low alloy pig iron and for the production of low alloy steel.

• • • **The new large** iron and steel plant whose construction has been launched during this war will sharply increase the demand for iron nickel ores. Therefore steps have been taken to tap new deposits in adjoining districts. Recent geological prospecting brought to light rich deposits of iron and nickel ores in the Orsk, Aktyubinsk district; more iron ores with a higher nickel content are suitable for the production of nickel, while those with a nickel content of up to 0.7 per cent are suitable for smelting of low-pig iron.

Of direct importance for the war was the tapping of ore deposits in the Shorian highlands, in western Siberia, to the southeast of the Kuznetsk steel mills. In addition to the deposits exploited since 1932, new deposits have been tapped in recent years, in the Shorian highlands, the most significant of them being Tashtagol deposits. The progress of ore mining in the Shorian highlands made it possible to reduce shipments of ore from the Urals for the Kuznetsk iron and steel industry.

It is expected that in the future its demands will be met 100 per cent by Shorian ore. This is especially important in view of the continued expansion of the Magnitogorsk mills, which draws increasingly on local deposits. Prospecting is at present in progress on new iron ore deposits in districts adjoining the Kuznetsk plant to the east of the Kuznetsk basin, near the town of Minusinsk in particular.

The transfer of the Kuznetsk plant with its blast furnaces to the use of local ore raises the problem of processing local iron ores which contain up to 0.4 per cent zinc. The evaporation during smelting of zinc exerts a harmful effect on the lining of blast furnaces and also on the blast furnace gas pipe line. The efforts of geologists, mining engineers, blast furnace and fire-proofing specialists have been mobilized for the solution of this problem.

Geologists and mining engineers have studied the question of distribution of zinc in iron ore deposits and the possibility of separate mining of ores with a higher and lower zinc content. Methods have been evolved for freeing iron ores from zinc in the process of ore beneficiation and for obtaining material suitable for the processes of zinc extraction. Changes have been introduced into the system of construction and in the design of blast furnaces for smelting ore containing zinc. Experiments are now being conducted with a view to selecting new types of fireproof materials capable of resisting zinc vapors.

Considerable results have been attained during the war in studying the iron ore base in central Kazakhstan, in the area of the Karaganda-Dzhezkazgan railway. Deposits of iron ore discovered there, coupled with the powerful base of coking coal at Karaganda, form the basis for a large-scale iron and steel industry.

Of lesser importance is the prospecting of iron ore deposits in Kirghizia and Uzbekistan. The inadequate size of prospected deposits in these Republics, and the fact that they are scattered in highland regions, still represent an obstacle to their industrial exploitation. The construction was lately begun of a new iron ore enterprise at Dashkezan (Transcaucasia, between Tbilisi and Baku), which will supply ore for the new steel mills now under construction near Tbilisi.

• • • **Following the liberation** of the Donbas and the Dnieper area, the restoration of Krivoi Rog iron ore district, the country's biggest, has become a very urgent problem. Damage caused to the Krivoi Rog mines is so heavy that it will take no less than two years to restore them.

As a result of the efforts of the Soviet miners during the seven months following the liberation of Krivoi Rog, 18 mines have been restored to supply ore to the blast furnaces restored in the Ukraine. Nevertheless the restoration of the biggest mines with an annual capacity of several million tons each is still ahead.

The high quality of its ore, their rich deposits and technical equipment, made the Krivoi Rog basin before the war a jewel of the world in the iron ore industry. But it will be restored to such a high technical level as to be able not only to bring up the output of high quality ore to the prewar level of some 20 million tons annually, but also to ensure the further progress of the southern iron and steel industry of the U.S.S.R.

# The INGERSOLL CUTTER GRINDER

★ ★ ★

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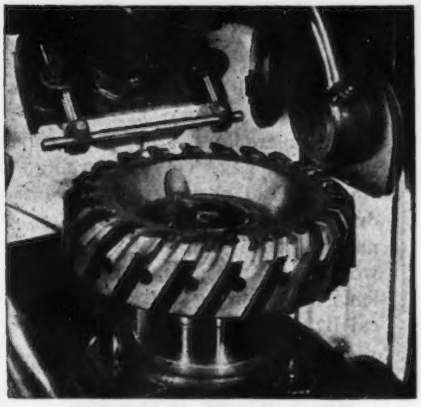

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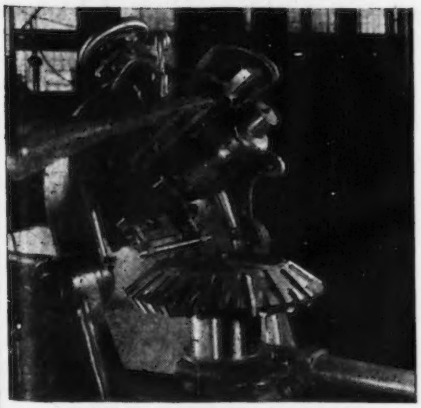

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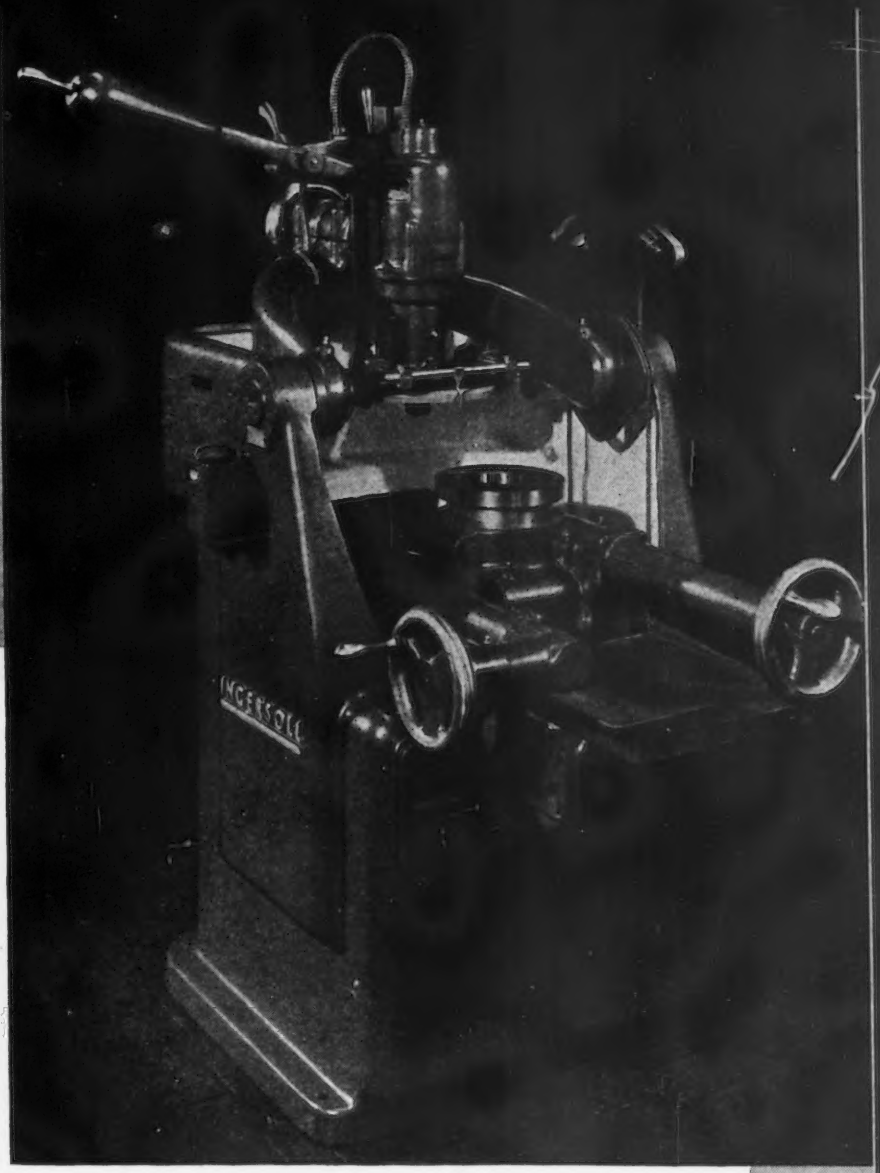


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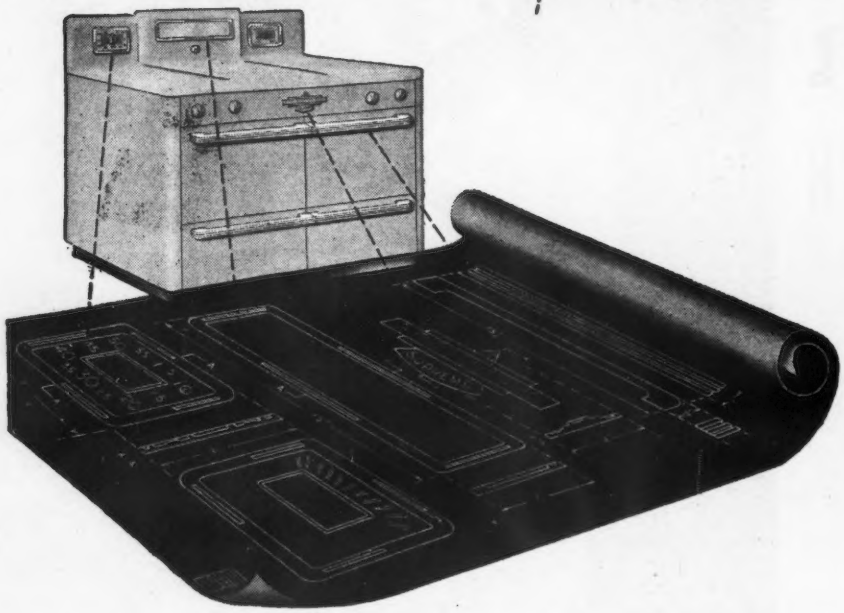

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## WPB Official Opposes Work or Fight Bill

*Washington*

• • • **Joseph D. Keenan, WPB** vice chairman in charge of labor production, said recently that he was opposed to work or fight legislation because he had not seen anything to justify a taking of this action by the government. Mr. Keenan said that Undersecretary of War Robert P. Patterson's estimate of the manpower shortage was too high and asserted that the applications of employment ceilings would result in war plants securing this number of employees within the next six months if it is proved they are needed.

One remedy Mr. Keenan suggested, to improve manpower supply and conditions, was to let the people know the consequences of war each day with a new casualty list and "they will get in and do the job."

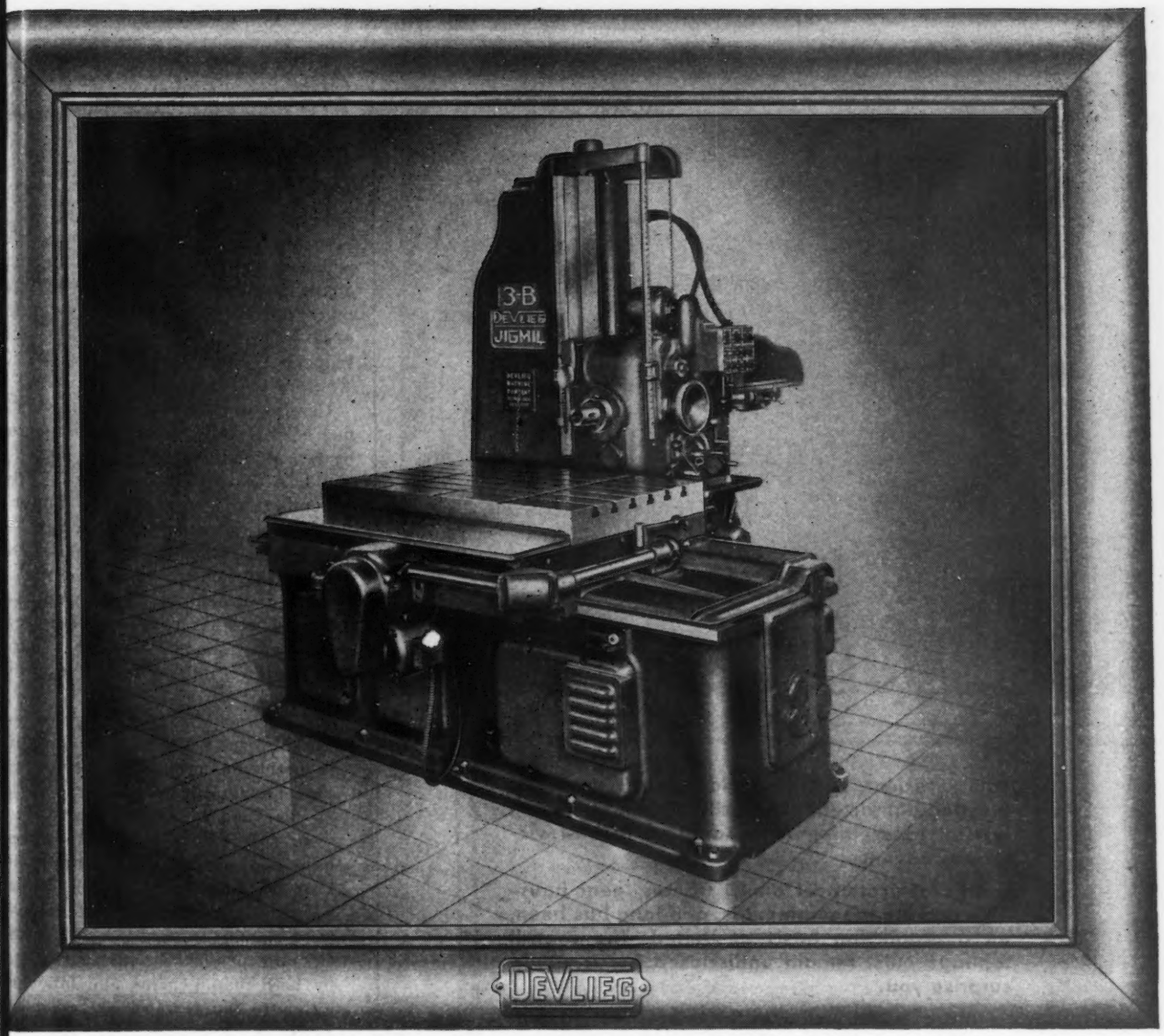
Not pessimistic about separations as some war agency officials have been recently, Mr. Keenan said that the quit rate in war industries is 1 per cent lower than in civilian industries and lower in 1944 than in 1943.

Declaring that small plants from 100 to 500 employees were an important untapped source of manpower in the coming cutback situation, Mr. Keenan said that the government should make every attempt to get prime contractors to use these smaller plants "instead of dispersing the workers and then try to have them drift into places where they are needed." He pointed out that this would decrease transportation problems and housing and other tight local living conditions.

## Lake Superior Iron Ore Consumption Over 7 Millions

*Cleveland*

• • • **Consumption of Lake** Superior iron ore, according to report of the Lake Superior Iron Ore Association, amounted to 7,090,174 gross tons during December, 1944, as compared with 6,882,696 tons during November and 7,509,096 tons during December, 1943. Of this 7,090,174 figure, 6,899,273 tons were consumed by U. S. furnaces and 190,901 tons by Canadian furnaces. U. S. consumption a month ago was 6,886,608 tons and that of Canada was 196,088 tons as compared with 7,318,034 tons for U. S. in December a year ago when Canadian furnaces used 196,062 tons.

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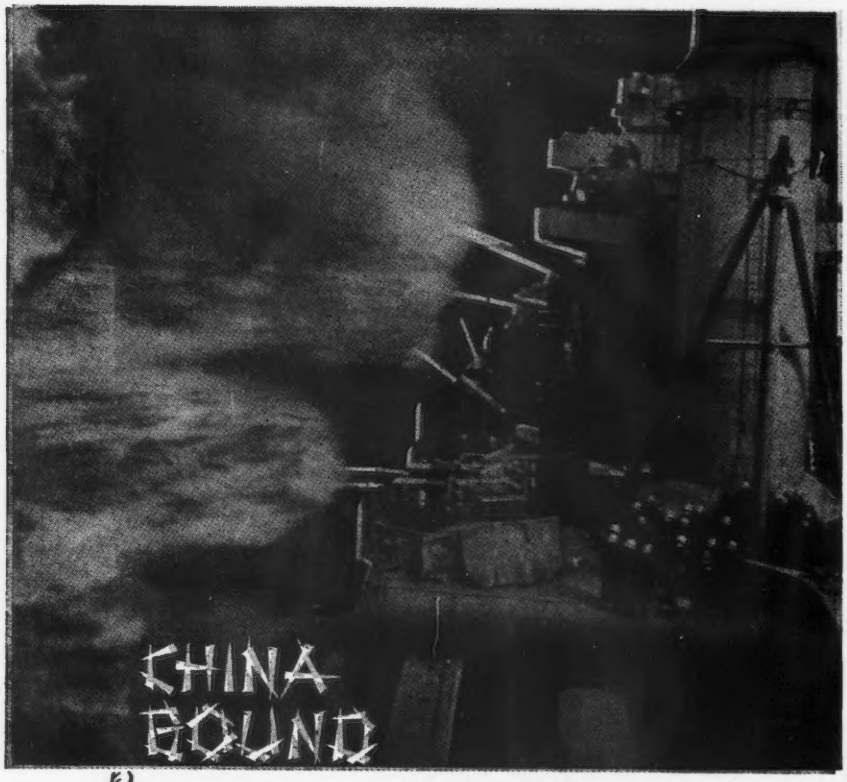


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## Apprenticeship Policy For Veterans Extende

***Washington***

• • • **Formulation of policies** concer ing extension of apprenticeship returning veterans and others w reported recently by Paul V. McNut chairman of the War Manpower Co mission, following a three-day confe ence of regional supervisors an industry consultants of the WM Apprentice Training Service.

Chief points in ATS policies rat fied at the conference and announce by Mr. McNutt are:

1. Although entrance of larg numbers of veterans into appren ticeship programs is desirabl proper selection of veterans will b necessary not only from the stand point of benefit to the veterans bu in the best interests of industry Veterans should not be "high pressured" into entering appren ticeship.

2. Persons eligible for appren ticeship in critical and essentia industry include (a) veterans an particularly those who were 18 t 24 years old when they entered ser vice; (b) 16-year old youths in non hazardous industry; (c) men mor than 26 years old, and (d) women

3. Sufficient numbers of appren tices should be enrolled in appren ticeship programs, participated i by both management and labor, i order to maintain a skilled labo force of approximately 5,000,00 persons.

4. The number of establishment having apprenticeship program recognized by ATS, now totalin about 32,000, should be increase rapidly to include 450,000 establish ments in order to provide sufficien apprentice training opportunitie for returning veterans. Veteran can draw subsistence allowance un der the GI law while learning a trade through apprenticeship.

5. Apprentice Training Service representatives do not have the function of interviewing veteran or offering them counseling ser vices, since interviewing and coun seling is the responsibility of the Veterans Employing Service of the U. S. Employment Service of WMC. On the other hand, the Apprentice Training Service is responsible for safeguarding of apprenticeship standards and the welfare of vet erans and others registered in ap prenticeship programs.

It was the consensus that industries

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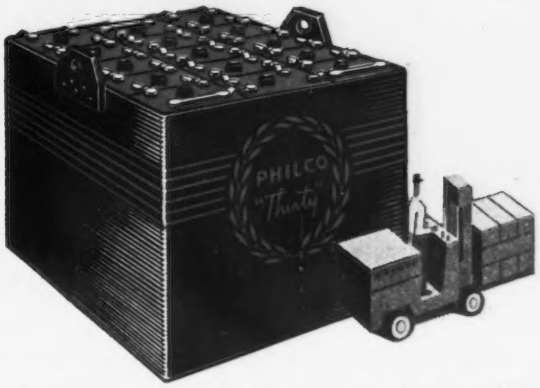


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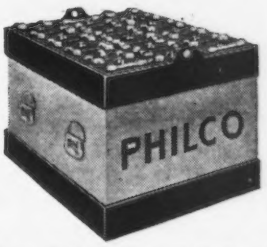


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4. A sample or drawing of article to be produced will assist us.

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2. What length tolerance is permitted?

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Brass and Bronze Rod • Forgings • Die Castings • Welding Rods




should not overlook inclusion of young persons reaching 16 years in order to prevent a "forgotten generation" in apprenticeship. It was also agreed that a foremost responsibility of management and labor is the inclusion of returning veterans between the ages of 18 and 24 who by reason of induction into the armed services have had to postpone learning skilled trades.

The regional supervisors and consultants reported that in all sections of the country there is a renewed interest in apprenticeship. William F. Patterson, director of ATS, who led the conferences, reported that the month of December, 1944, was the heaviest month in the 11-year history of ATS from the standpoint of numbers of new apprentice training programs set up in industrial establishments.

## Foresees Year-Round Air-conditioning From Outside Atmosphere

***Lehigh, Pa.***

• • • A unique method of heating a home by extracting heat from the outdoor air, even when the temperature outside is below freezing, was foreseen here as being a definite commercial possibility in the near future and was declared to offer considerable fuel economy and efficiency.

This forecast was made by G. K. Marshall, General Electric air-conditioning engineer of Bloomfield, N. J., who said that several installations for this type system were made before the war and are still operating satisfactorily. He spoke before the Lehigh Valley Section, American Institute of Electrical Engineers.

Not only heating but year-round air-conditioning is possible with the same equipment employed in this method, explained Marshall. Because the system actually produces heat by making cold air colder, there will be found, he said, many commercial applications where it will be economically advantageous to use both heating and cooling simultaneously. In residences, where both effects are not desired at the same time, the equipment can be made either to heat or cool, and it can be changed from producing one to the other.

Emphasizing increased output from such a unit, Marshall said that at about 52 deg. F. outdoor temperature, it will provide 4 times as much heat as was available in the electricity consumed. Even allowing 15 per cent for transmission losses between the

# SLOW FEEDING LOSES OUT

## War Production *Speeds* with CORTLAND CHUCKS and SEGMENTS

Cortland Chucks and Segments stack up against two well-known competitive brands in another War Production Test Run . . . and beat both in speed and production costs.

*TEST FACTS:* A leading aircraft manufacturer . . . using a Blanchard No. 18 Vertical Surface Grinder . . . Wheel Speed 705 R.P.M.

*WORK:* Sparbeam, of irregular shape approximately 7/8" x 3½" G.M. 4340 steel, normalized to 37-40 Rockwell: table R.P.M. 18.

TEST RESULTS

| *Detail* | CORTLAND Chuck and Segments | Competitive Brand No. 1 | Competitive Brand No. 2 |
|---|---|---|---|
| Rate of Feed | .016 | .008-.016 | .004 |
| Pieces per Table Load | 16 | 10 | 16 |
| Ampere readings | 30 - 35 | 30 - 35 | 30 - 50 |
| Dressings necessary | None | 1 | 3 |
| Work heat? | No | No | No |
| Grinding time | 23 min. | 23 min. | 66 min. |

Note that Cortland Chucks and Segments ground 16 pieces in the time required for Brand No. 1 to grind 10 pieces—and in about a third of the time required for Brand No. 2 to grind 16 pieces. This *war production* is *not* simply a matter of proper wheel specification, but is also the result of Cortland Segment design—*Diagonal Shearing with Varying Contact.* If you are interested in obtaining better surface grinding, write for the Cortland bulletin featuring Cortland Chucks and Segments.

**CORTLAND GRINDING WHEELS CORP.**
7 Cortland Street Chester, Massachusetts

## Diagonal Shearing with Varying Contact Means Better Surface Grinding

A true segment, the grinding surface has narrow ends that *start* the work with minimum shock and resistance. Straight inner edge of segment passes diagonally across work with a *shearing* action that *cuts* and *removes* the metal. Varying contact area insures longer exposure to coolant—decreases heat—reduces segment wear—conserves power.

**CORTLAND**
*Chucks and Segments*

# KINNEAR STEEL ROLLING FIRE DOORS

## . . . for quick, positive, automatic closure whenever fire strikes!

*Pushed* downward by a strong starting spring . . . *controlled* in downward speed by a special safety device . . . and operable *after* automatic closure for emergency use, The Kinnear Steel Rolling Fire Door offers the most dependable, thorough and *safe* fire closure available. These efficient doors remain coiled out of the way overhead when not in use, but they lower into place with speed and efficiency when fire threatens — combating one of the major causes of fire loss by cutting off drafts, blocking the spread of flames, and confining the fire to smaller areas. Approved and labeled by Underwriters' Laboratories, they have saved as much as 33% of their cost *annually*, in reduced insurance rates. Built to fit windows, doorways or other openings of any size. Write for complete information on Kinnear Rolling Fire Doors. The Kinnear Mfg. Co., 1760-80 Fields Avenue, Columbus, Ohio.

*Kinnear Rolling Fire Doors can also be equipped for daily use as efficient service doors, with or without motor operation. But the regular (non-labeled) Kinnear Rolling Doors are preferred for service use where extra fire protection is not required.

*Factories: 1760-80 Fields Avenue, Columbus 16, Ohio; 1742 Yosemite Avenue, San Francisco, California. Offices and Agents in Principal Cities.*

SAVING WAYS IN DOORWAYS KINNEAR ROLLING DOORS




generating station and the home, it will deliver at the 52 deg. F. outdoor condition 116 per cent of the heat that was in the fuel burned for supplying energy.

"As time goes on even more efficient equipment of this nature may be developed," he declared, "and it is not impossible to imagine that such installations may some day be required just from the point of view of conservation of our national fuel resources."

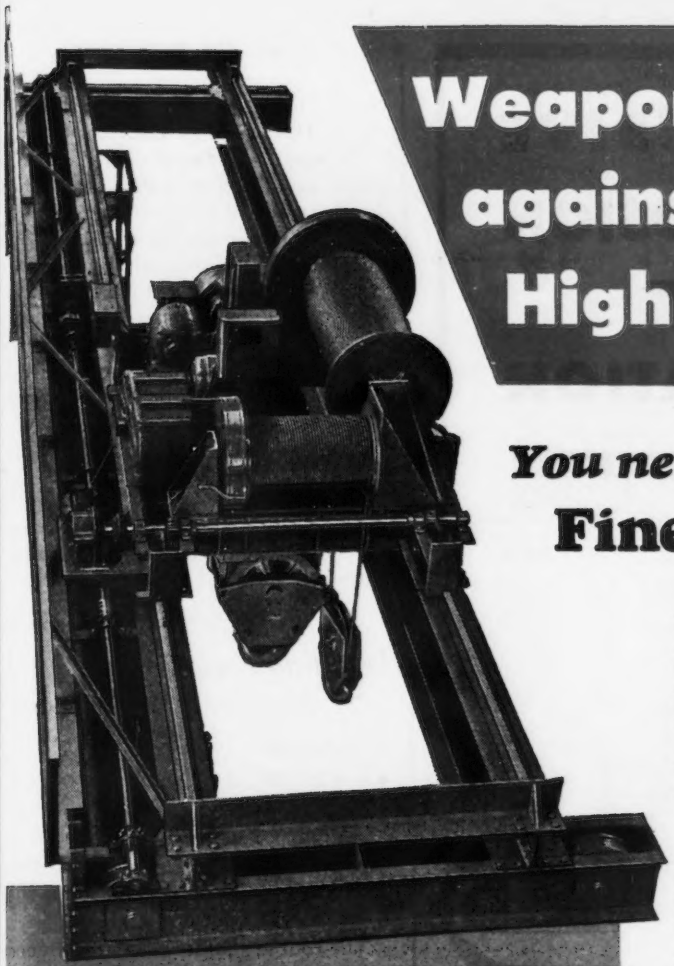
Basis of the process described is a heat pump, a refrigerating system in which advantage is taken of the heat given off in the process of cooling air rather than of the cooled air itself. In heating, the unit will realize a minimum of 87 per cent fuel efficiency, and, under some conditions, the fuel efficiency will exceed 100 per cent.

Underlying principle pointing to the possibility of using this reverse cycle refrigeration method for year-round air-conditioning, is the scientific fact that there is heat in the air at all times, in frigid winter as well as summer. Reverse cycle refrigeration, or, as it is more commonly called, the heat pump, works on the method of separating this heat in the air from whatever cold there is in the air, adding the heat produced by the electrical energy used to do this work, then piping the result through the house.

Similar results could be obtained with present electrical refrigerating equipment working in reverse, Marshall said. In these, heat extracted from the air is absorbed and then disposed of to permit the remaining cold air to lower the temperature inside an enclosed cabinet. In the heat pump, however, where the primary object is to warm the surrounding room, heat always present in the air is utilized and the cold air which remains thrown off.

Essential elements of a heat pump, according to Marshall, are an evaporator, a compressor, a condenser and a motor. In operation the heat pump draws in outdoor air through the evaporator, which contains a liquid refrigerant. Here the liquid refrigerant is boiled by the heat absorbed from the outdoor air and is changed to a gaseous form. This heated gas is fed to the compressor, where its temperature is increased by pressure. Discharged to a condenser, the refrigerant, now in a gaseous form, becomes a liquid again and in so doing transfers the heat it absorbed

# Weapons in the War against Delay and High Costs . . .



45-foot span, cab-controlled traveling crane with 20-ton main hoist at 5 F.P.M., and 5-ton auxiliary hoist at 20 F.P.M. This combination of modern mechanical, electrical, and safety equipment is typical.

## *You never need to Pamper these* Fine Hoists and Cranes

Pampering hoists and cranes has never been a popular pastime with maintenance men, *or with operators.* That goes double today! Equipment you have to "handle with gloves" can't stand up under pressure when the cards are down. And no amount of off-shift reconditioning can make up the production lost.

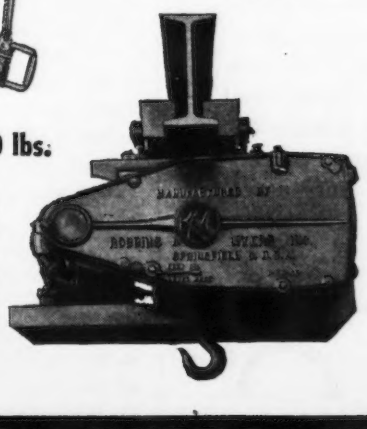
Either equipment has what it takes, *or it hasn't.* There's no middle ground—and there never will be. Never again can misfit machines satisfy a cost-conscious world, nor will jack-of-all-trades performance be acceptable in our coming era of skillful specialization.

Call it forward thinking, if you will, the fact remains that Robbins & Myers has never subscribed to the theory of super-standardization. There are *hundreds* of standard types and models of R & M hoists and cranes, each designed to fit some service need *exactly*—to do that particular kind of job *exceptionally well.* These are the machines that are earning such acclaim in the battle of all-out production.

Let us help you drive that wedge between cost and selling price in the days that lie ahead. *Today* is not too soon to get the facts.

### Lifts up to 1 Ton

**A compact, low-headroom, welded-steel-frame hoist with a fully enclosed, splash-lubricated, alloy-steel gear train and oversize automatic load brake. Quality-built for long life. Available for all mountings. Type F ½.**



### For Loads up to 15,000 lbs.

**A simple, sturdy, pendent-push-button-controlled hoist with safety frame of welded steel. Automatic load brake requires no adjustment for years at a time. An easily accessible design that is free from complicating "gadgets." Type F1.**

## *Take It Up with* R & M

| | |
|---|---|
| Albany.....364 Broadway | Kansas City, Mo.....215 Pershing |
| Atlanta.....317 Walton Bldg. | Los Angeles .....2257 E. 15th St. |
| Baltimore, Lombard & Concord St. | Meriden, Conn....401 Liberty St. |
| Boston.....74 Needham St. | Newark.....700 Bergen St. |
| Chicago.....2400 W. Madison St. | New York.....200 Varick St. |
| Cincinnati.....418 New St. | Philadelphia....401 N. Broad St. |
| Cleveland...470 Rockefeller Bldg. | Pittsburgh....H. W. Oliver Bldg. |
| Dallas.....1100 Cadiz St. | Providence.....44 Clifford St. |
| Denver.....1420 16th St. | San Francisco, 116 New Mtgmry St. |
| Detroit... 7376 Grand River Ave. | Seattle.....216 Walker Bldg. |
| Houston....3715 Harrisburg Blvd. | Syracuse...204 State Tower Bldg. |
| Jacksonville.....305 Bisbee Bldg. | |

Montreal....Lyman Tube & Supply Co., Ltd.

**ROBBINS & MYERS · INC.** HOIST & CRANE DIVISION · SPRINGFIELD, OHIO
In Canada: Robbins & Myers Co., of Canada, Ltd., Brantford, Ont.

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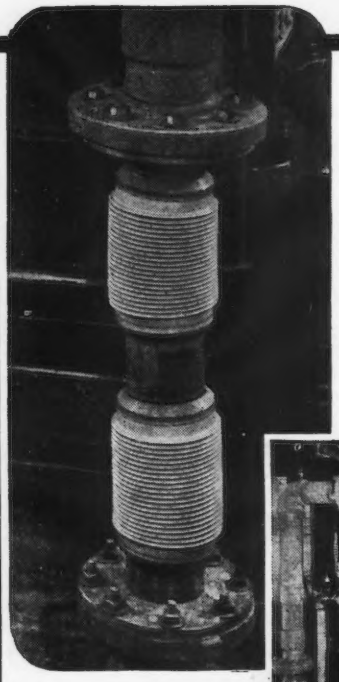
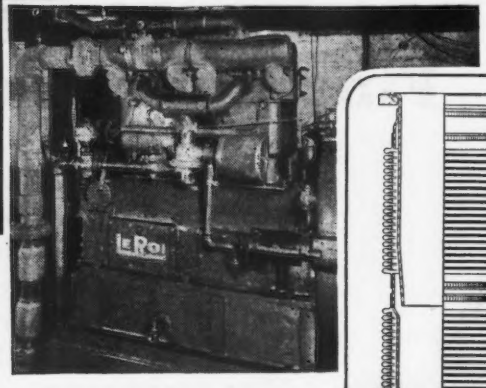
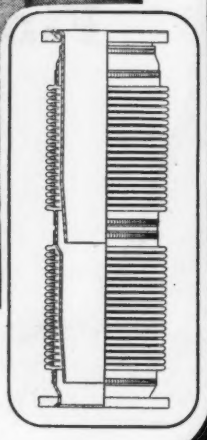


EXCESSIVE
CORROSION
+
VIBRATION





*demand*

**REX-FLEX Stainless**
**Steel-lined exhaust units**

Excessive heat, corrosion and vibration require an exhaust unit that is *durable.* Gas engines, especially, demand a Rex-Flex lined exhaust unit to best withstand these destructive forces.

A Rex-Flex *stainless-steel* unit was used in the above installation, since ordinary steel is more readily affected by corrosive action—caused by acidulated condensation during shut-down periods. Through the use of a lined Rex-Flex exhaust unit, a smooth bore flow was obtained—undesirable back pressures were avoided and longer unit life was assured. Flexibility was increased also, due to the Rex-Flex method of attaching the liner, which allows complete freedom of axial and radial motion within specified limits.

No matter what your exhaust connector needs are—now or in the future—you can increase operating life and efficiency with Rex-Flex Stainless-Steel lined exhaust units. Send your installation requirements to our Engineering Department—now.

**Flexible Metal Hose for Every Industrial Use**

**CMH CHICAGO METAL HOSE CORPORATION**
**MAYWOOD, ILLINOIS**

**Plants: Maywood and Elgin, Ill.**




from the outdoor air to rooms of th house through appropriate ducts.

In regard to cost of operation, Mar shall said, "Using power at 1c. pe kwh., the heat pump would have th same operating cost as coal at $14 pe ton, oil at 10c. per gallon, manufac tured gas at 40c. per thousand cu. f or natural gas at 80c. per thousan cu. ft. This is approximately the pic ture as it exists today with a hea pump constructed with general pur pose refrigeration equipment in climate such as Pittsburgh and draw ing its evaporator heat from the out door air. But it can be improved b further development of the equipmen or by finding a higher temperatur source of heat than outdoor air."

## *Westinghouse Plans New Welding Course*

***Pittsburgh***

• • • A seven part training course on resistance welding control, compris ing slide sound films, lesson books quiz book, and an instructors manual has been prepared by Westinghouse Electric & Mfg. Co.

The course sets forth the differences between types of welding processes, explains electronic control for resis tance welding, and how this method of control adapts resistance welding to industry.

The full seven part course should be given over a period of 8 to 10 hr. allowing two hours for each of the four lessons.

Subjects covered by the course are:

Part One: Basic definitions of weld ing technology; forge welding; gas welding; thermit welding; electric arc welding; resistance welding.

Part Two: Types of resistance welding work; spot; projection; seam; butt; flash; duty cycle.

Part Three: The ignitron and the thyratron; fundamentals of electronic tubes; ignitron, thyratron.

Part Four: How the flow of resis tance welding current is started and stopped.

Part Five: How the amount of re sistance welding current is controlled; phase shift heat control.

Part Six: Electronic timing controls in resistance welding; basic principles of electronic timing; synchronous-pre decision weld timer; nonsynchronous timer; sequence-weld timer.

Part Seven: Energy-storage control; capacitor-discharge type; magnetic type.

# SOLNUS OILS...Lowered Temperature of 1200-Pound Roll Bearings, Eliminated Semi-Yearly Oil Change in Paper Mill

A prominent manufacturer of fine papers ran into trouble in lubricating two super calenders. Bearings on the 14 rolls were 15" in diameter, revolving in bronze bushings. A well-known make of oil was being used in the circulating system, but the bearings were running hot. The oil sludged and had to be changed twice a year. Finally, when one bearing caught fire, the management called a Sun Oil engineer for his recommendation.

**Forty gallons** of oil were drained from the system and replaced with the proper grade of Solnus Oil. The machines were put back in operation, and bearings stayed at a normal operating temperature.

**After two years,** the management reported the Solnus Oil did not sludge.

**Continuous operation** of this sort is only one of the results of good lubrication. Paper mills in many parts of the country are utilizing the experience of Sun engineers and the quality of Sun lubricants to maintain peak operating levels, to cut down maintenance costs, and to eliminate chronic trouble spots. Sun makes a complete line of quality oils and greases for every type of paper machinery, and for all other industrial equipment. Call in a Sun engineer for a scientific study of your oil needs.

**SUN OIL COMPANY** · ***Philadelphia 3, Pa.***

*Sponsors of the Sunoco News Voice of the Air — Lowell Thomas*

SUNOCO

**SUN INDUSTRIAL PRODUCTS**

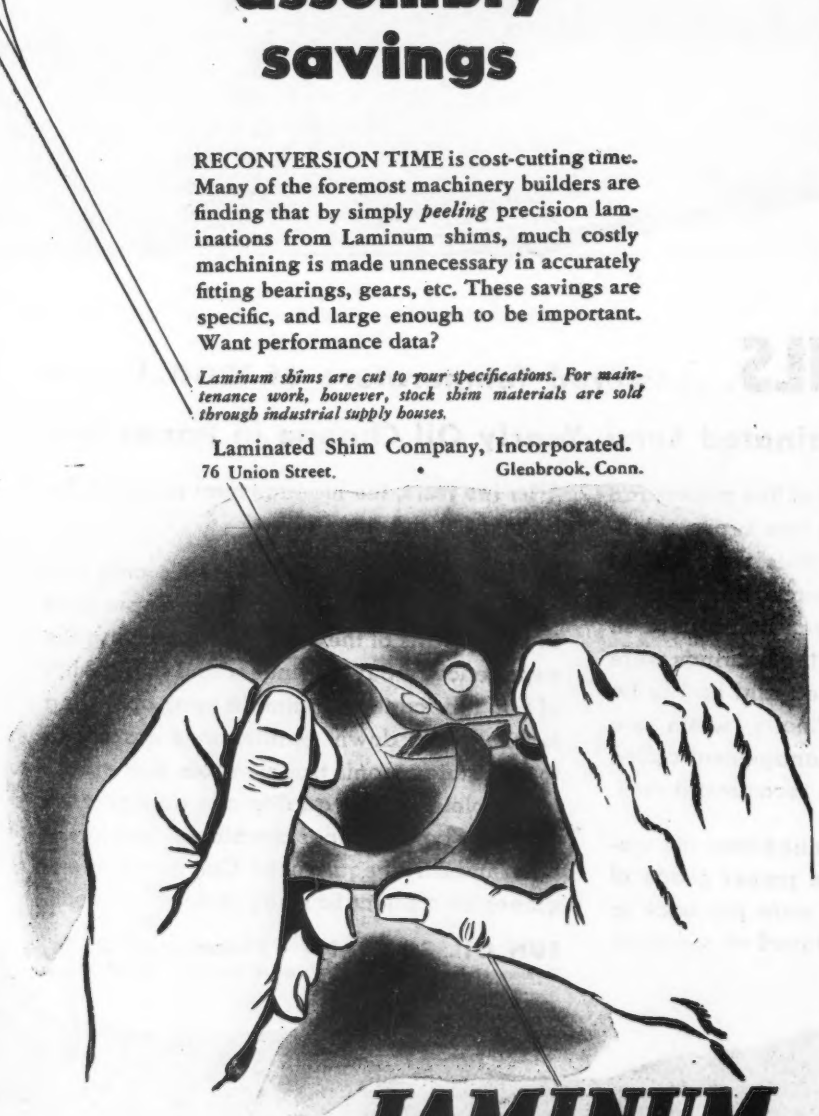
*OILS FOR AMERICAN INDUSTRY*

# IMPORTANT
## assembly savings

RECONVERSION TIME is cost-cutting time. Many of the foremost machinery builders are finding that by simply *peeling* precision laminations from Laminum shims, much costly machining is made unnecessary in accurately fitting bearings, gears, etc. These savings are specific, and large enough to be important. Want performance data?

*Laminum shims are cut to your specifications. For maintenance work, however, stock shim materials are sold through industrial supply houses.*

Laminated Shim Company, Incorporated.
76 Union Street. • Glenbrook, Conn.



LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

2218




## Federal Expenditures Expected to Decli

*New York*

• • • The prospect is that during t next fiscal year, which will end Ju 30, 1946, there will be some curta ment of Federal spending, accordi to the Alexander Hamilton Institu Even if the war with both Germa and Japan continues throughout t year, expenditures are expected to d cline from the record high figure $98,912,000,000 this year to $82,53 000,000 next year. This drop will due entirely to a curtailment of w expenditures from $88,000,000,0 this year to $69,400,000,000 next ye Other expenditures will show a su stantial increase, rising from $1 912,000,000 to $13,130,000,000.

The decline in war expenditur next year, even though the war do not come to an end, will not be due a less vigorous prosecution of t war but to the fact that the buildi up of the armed strength will ha been completed this year, maki necessary the financing of only ma tenance and replacements next ye If hostilities should cease before Ju 30, 1946, expenditures might dr below the budget estimate.

Despite the prospective curtailme of spending during the next fis year, expenditures, as estimated the budget, will still be far above r ceipts. Although next year's defic amounting to $41,275,000,000, will under the present year's deficit, it w still represent a substantial amou As a result, the debt is expected reach a new high record of $29 300,000,000 on June 30, 1946. T will compare with a debt of o $25,484,000,000 on June 30, 1919, t peak reached as the result of Wo War I.

Next year will represent the s teenth consecutive year of defic spending.

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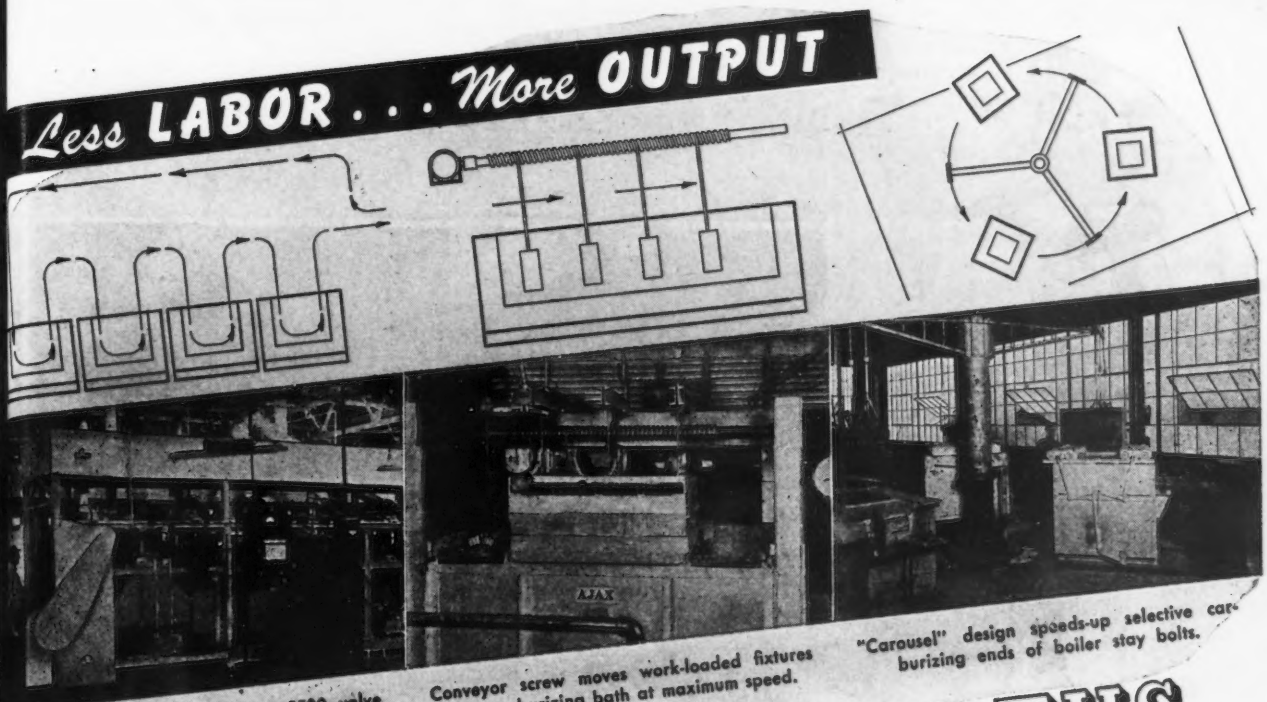
## Drum Sheet Steel Tighter

*Washington*

• • • The Steel Shipping Contai Industry Advisory Committee was t by WPB officials at a recent meeti that drum sheet steel is becom more critical and that some delays deliveries from the mills may be pected in the first and second qu ters. Recommending indefinite ret tion of Steel Drum Order L-197, amended Jan. 18, committee memb said that manpower shortages absenteeism are contributing fact in limiting production.

# Less LABOR . . . More OUTPUT



1 man selectively case hardens 5500 valve pusher rods in 1 hour.

Conveyor screw moves work-loaded fixtures thru carburizing bath at maximum speed.

"Carousel" design speeds-up selective carburizing ends of boiler stay bolts.

# Mechanized SALT BATHS for LOW-COST PRODUCTION

**Technical Literature Available on Request**

- ☐ *"Liquid Carburizing Transmission Gears"* W. A. SILLIMAN
- ☐ *"Merits of Salt Baths and Air Furnaces for Treating Aluminum Alloys"* JAMES SNIDER
- ☐ *"Isothermal Quench Baths Applied to Commercial Practice"* H. J. BABCOCK
- ☐ *"Salt Bath Hardening of NE Steels"* L. J. SHEEHAN
- ☐ *"Hardening High Speed Taps and Dies in the Electric Salt Bath"* P. C. FARREN
- ☐ *"Carburizing Gears in the Electric Salt Bath Furnace"* W. F. SORENSON
- ☐ *"Electric Salt Bath Treatment of Aluminum Aircraft Alloys"* C. SANTORE
- ☐ *"Salt Bath Quenching Processes"* H. J. BABCOCK
- ☐ *"Ajax-Hultgren Electric Salt Bath Furnaces"* CATALOG 107B

By overcoming the inherent deficiencies in *externally* heated salt baths (size, shape limitations and short life of pots, plus excessive fuming and low operating efficiency), the Ajax *internally* heated salt bath furnace has made complete mechanization of hundreds* of heat-treat processes possible. Now . . . heat, quench, wash and dry . . . in automatic sequence! The Ajax method improves quality thru elimination of uneven heating and distortion by individual, uniform, cyclic treatment (differentially heated if desired) of each piece, hung vertically in fixtures. A thin film of salt protects the work surface at all times, preventing decarb, scale and pitting . . . no special atmosphere needed, since the salt bath controls atmosphere by eliminating it. Ajax immersed electrodes develop electromotive circulation of the bath . . . heating 4 to 6 times faster than radiation or convection type systems . . . requiring correspondingly less floor space and spectacularly extending the life of ceramic or metallic pots (which may be shaped at will for the work involved). Process engineers with an eye to the post-war competitive market are discarding "batch type" planning for the modern, proven Ajax system. Our staff is competent and ready to offer its thorough assistance.

**There's an Ajax installation near you!*

**AJAX ELECTRIC COMPANY, INC.**

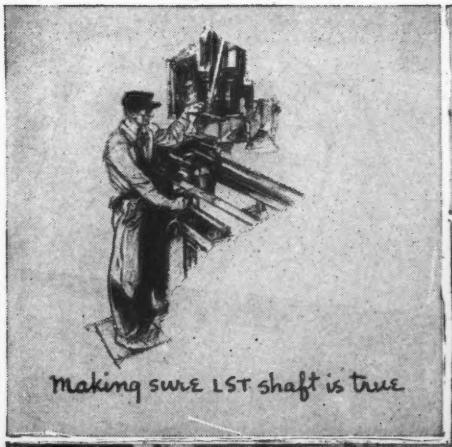
**FRANKFORD AVENUE AT DELAWARE AVENUE, PHILADELPHIA 23, PA.**

SELF-TEMPERING • SELF-QUENCHING

**THE AJAX HULTGREN ELECTRIC SALT BATH FURNACE**

ASSOCIATE COMPANIES

Metal Company • Ajax Electric Furnace Corporation • Ajax Engineering Corporation • Ajax Electrothermic Corporation



Making sure LST shaft is true

Cold drawing steel bars

FROM AN ORIGINAL DRAWING AND SKETCHES MADE AT J&L PITTSBURGH WORKS BY ORISON MACPHERSON

# BETTER STEELS FOR WAR BY COLD FINISHING

Cold finished steels are greatly aiding the war effort. Enormous tonnages of these better, stronger steels go into fighting equipment. The machine tools that produce this fighting equipment are themselves largely made of steel that has been worked cold.

Cold working is an art at J&L, for it was here cold rolling was invented. Long accumulated skills and experience, aided by research, help J&L to solve quickly many an urgent problem of Army supply and Navy procurement.

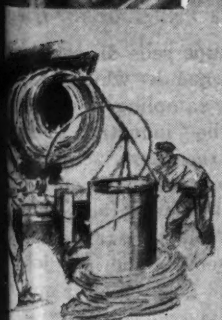
War has greatly accelerated and expanded the applications of cold finished steel. This will bring about greater peacetime uses of this versatile steel—for better living.

**JONES & LAUGHLIN STEEL CORPORATION**

PITTSBURGH, PENNSYLVANIA

J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR AND PEACE



ing rods for cold finishing

## COLD FINISHED

**Pulling cold steel bars** through diamond-cut dies to within ten-thousandths of an inch of desired size (see illustration) gives them hard, shining surfaces, makes them extremely accurate in size and straightness, and increases their strength and resistance to fatigue. Large and small steel bars are cold finished by turning, grinding, polishing, drawing, cold rolling.

**Cold finished steel aids war,** being used in practically every piece of Army, Navy, Marine and Merchant Marine equipment. Tiny, cold finished rods, smaller than the leads in automatic pencils, are being furnished by Jones & Laughlin Steel Corporation to be made into parts for watch-like fuses in aerial bombs.

**Propeller shafts for LST's,** huge steel rounds 7½ inches in diameter and 20 feet long, several of which are used in each of the famous landing barges, are being produced in J&L cold finishing mills. Smaller sizes are used in speedy PT boats. Other cold finished steel is used in enormous quantities for shells and parts for planes, tanks, jeeps, trucks, guns, rockets, range-finders, motors, ships, landing craft and other military equipment.

**Cold working of metal** is an ancient art. References to it are found in the Bible. Cold drawing of metals (wrought iron, copper, brass, bronze) is known to have been practised in Europe in the 13th century. First authentic record appears in the reign of Queen Elizabeth, who, in 1564, brought skilled Saxon metalworkers into England to work at this art. Cold finishing of iron or steel bars did not develop until the advent of steel (in the 1860's) laid the foundation for today's great cold finished steel industry and rapid development of modern machine tools.

**J&L invented cold rolling in 1860** when Bernard Lauth, partner of B. F. Jones, founder of Jones & Laughlin Steel Corporation, experimented successfully with passing cold iron and steel bars through a series of rolls, effecting a slight reduction in each pass. The process, patented, was a J&L specialty for many years.

**The machine tool,** the machine that makes machinery, was invented by young British mechanic, Joseph Whitworth (born December 21, 1803) to improve weaving and cotton spinning industries. Previous to Whitworth's many inventions, machinery for manufacturing was crudely made up by hand with chisels, hammers, files, primitive lathes and simple screw cutting machines which did not even cut standard threads. Sir Joseph Whitworth's inventions (he was knighted for them) and the subsequent invention of cold finishing of steel brought about a great industrial revolution, now known as the Machine Age.

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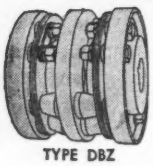
# THOMAS
## Flexible COUPLINGS
FOR *any* SPEED OR SERVICE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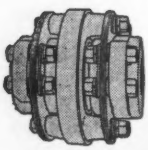
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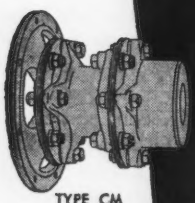
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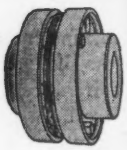
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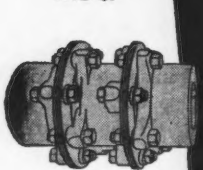
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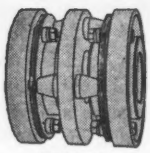
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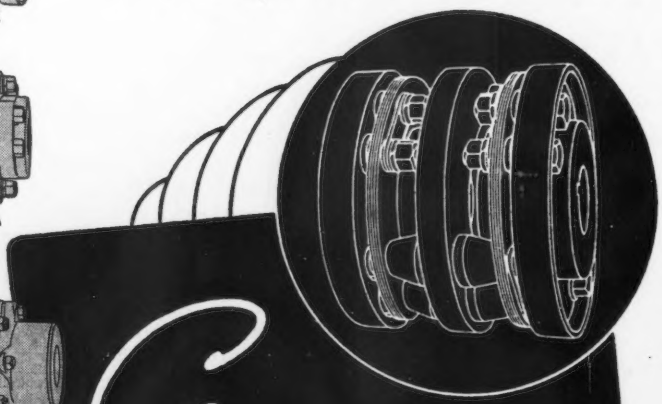

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.....the 4 destructive evils found in all other types and makes of couplings.

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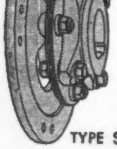
These are the five essential features of Thomas Flexible Couplings that insure a permanent care-free installation.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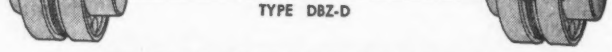
WRITE FOR COMPLETE ENGINEERING CATALOG



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THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA




## *Adopts New Wage Rates For Indianapolis And Chicago Metal Plants*

***Chicago***

• • • Permanent stabilized wage rates and rate ranges for metalworking industries of Chicago and Indianapolis were adopted Jan. 21 by the Sixth Regional War Labor Board.

The new rates are based on a comprehensive survey of wage structures in the areas, prepared by the Chicago regional office of the Bureau of Labor Statistics. The survey, which also took in the areas of Minneapolis-St. Paul, Milwaukee, South Bend, Springfield and Rockford, gathered data representative of 620,000 workers in about 1500 plants of selected metalworking industries.

Occupational wage rate data thus gathered was obtained directly from payrolls and other basic records by field representatives of the bureau. The board then calculated wage rates and rate ranges for the various job classifications.

Rates for the Chicago metalworking industry range from 75c. an hr. for job classifications including janitors, watchmen, Grade C machine welders and hand truckers to $1.24 for Grade A production machinists.

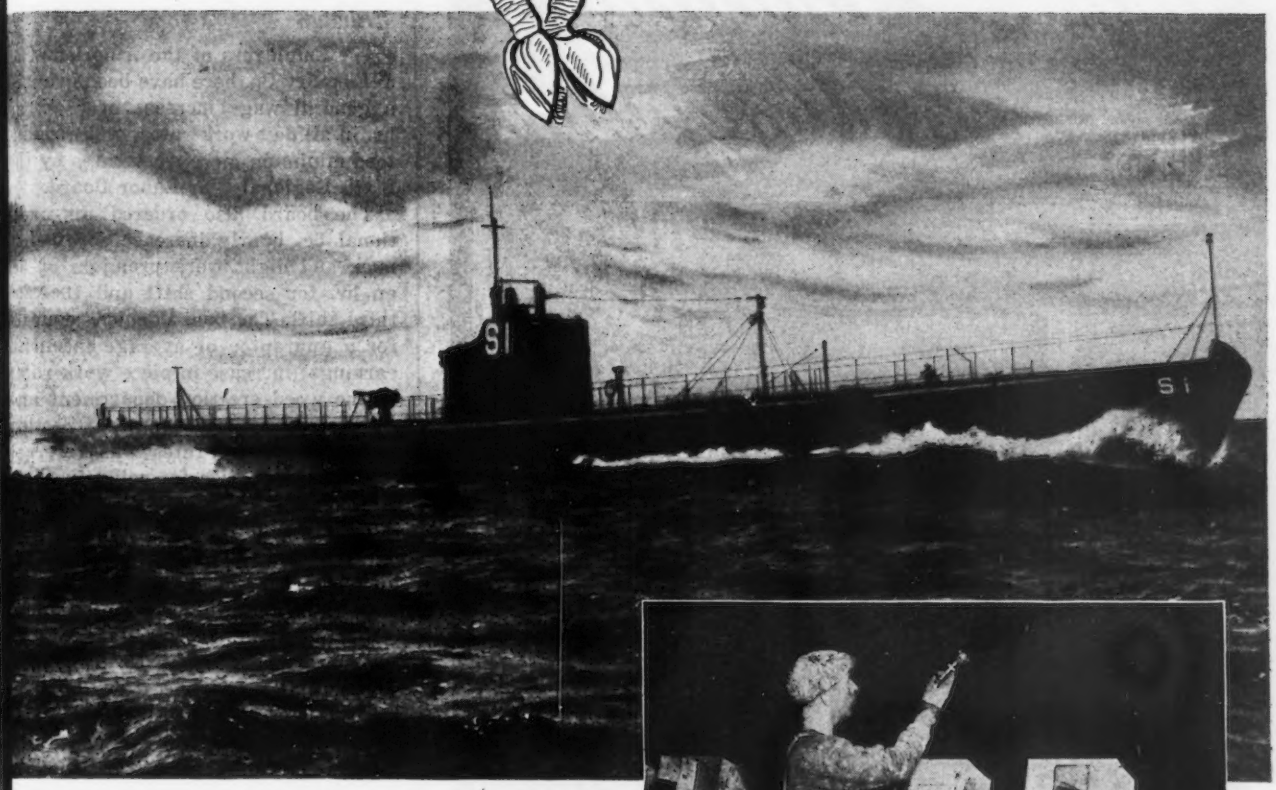
Each job classification has a range from minimum to maximum rate. The ranges vary from 10 cents (70 to 80c.) for unskilled classifications to 20c. ($1.14 to $1.34) for top skilled classifications.

These stabilized rates and ranges are not intended to disturb existing wage structures, the board explained, but are established to limit the degree to which existing wages may be adjusted with WLB approval. These rates are used as guides by the board in deciding wage adjustment cases. Increases to these rates may not be made without the War Labor Board approval.

The new rates supersede an earlier temporary rate schedule which was based on a smaller sampling of existing wages in the industry. Job descriptions for the new schedule differ significantly from those of the old schedule, so that no direct comparison of the old and new schedules can be made. In general the new job descriptions require greater skill and responsibility than the old job descriptions.

Metalworking rates for the other five important centers of the industry in the Sixth WLB region also are being prepared.

# WHY BARNACLES DON'T LIKE U. S. SUBS!



TO UNCLE SAM'S SUBS moving in for a "kill" or fighting for their lives, *underwater speed* means erything. But no sub can muster top speed if her ll's fouled by barnacles and other animal and plant ganisms that attach themselves even to steel bottoms.

ere's a problem the great U. S. Navy's been working for years—and not without results. At the Navy Yard Portsmouth, New Hampshire, for example, sub hulls e now protected against barnacles and other fouling ents, as well as against rust, with a special cold plastic int. This heavy paint cannot be brushed on satisctorily. But sprayed from DeVilbiss guns, it forms a rfect anti-fouling finish to which barnacles cannot tach themselves. Other types of DeVilbiss equipment e used at this same yard for spraying subs with uminum-chromate and other anti-corrosive paints—ith the same excellent results.

elping to keep barnacles away from submarines is only one of *countless* unusual wartime achievements credited to the flexibility and adaptability of DeVilbiss-built products. Among these products—spray equipment, exhaust systems, air compressors and hose and connections—we believe we can find the answer to *your* problem, too . . . no matter how tough it may be.

Remember these facts when conversion raises new painting or coating requirements in your plant. Let us show you how our 57 years of experience in utilizing and handling air and our four lines of specialized equipment can produce the most efficient spray system for your peacetime operations.

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Artillery Shells Produced with

*Uniform Ductility and Elongation*

R-S QUALITY PRODUCTS SINCE 1908

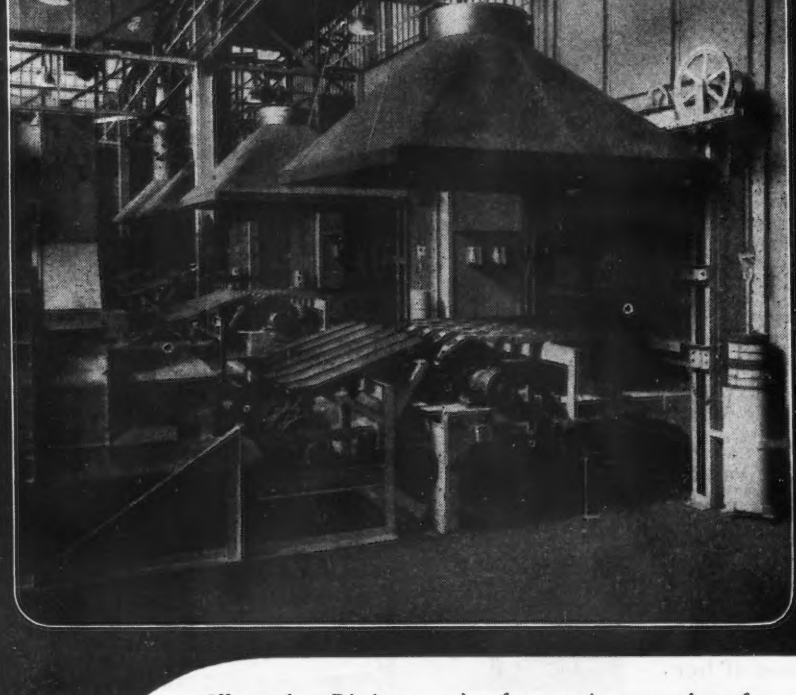

*Illustration:* Discharge ends of convection type draw furnaces where the heat treatment of heavy artillery shells is completed after the shells are hardened and quenched.

The continuous furnace is a production line machine which not only eliminates costly materials handling, but lends itself to accurate temperature control as well. Uniform physical properties are obtained in the process. Ductility and elongation are held to specified limits.

Continuous automatic operation throughout each of the four complete units requires a minimum of manpower.

For low-cost and efficient production with better metallurgical results, you can *depend upon the designing ability of R-S Engineers.*

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R-S PRODUCTS CORPORATION

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BUY WAR BONDS


NEWS OF INDUSTRY

## Car Workers Granted Wage Increase by WLB

***Chicago***

• • • Employees of the American Car & Foundry Co. here have been granted a general wage increase of 2½c. an hr. in all day work rates, and guaranteed minimum piece work rates by the Sixth Regional War Labor Board.

The board also ordered an additional 5c. hourly increase for utility men, and night work premium of 5c. an hr. for second shift and 10c. for third shift. The board denied requests for a guarantee of average incentive earnings; increase in piece work rates in the wood erection department and reclassification of carpenters. Setting of new incentive rates was referred back to the parties for collective bargaining.

Twenty-four issues were decided by the board in its directive, which involved 1500 workers. Among other things, the board ordered maintenance of membership; retroactivity of the wage provisions to Oct. 15, 1943; final arbitration of grievances; no-strike or lockout clause, and call-in pay for employees who report for work and are sent home for lack of work, not to be paid if employee previously notified not to report, or in case of strikes, riots, accidents, fires, floods, or power breakdowns. Employees were represented by Local 453, United Auto Workers (CIO).

## Westinghouse Halts Electric Iron Output

***Mansfield, O.***

• • • Civilian goods production of electric irons at the Electric Appliance Division plant here of the Westinghouse Electric & Mfg. Co. has been voluntarily halted in order to transfer employees to critical war work, according to J. H. Ashbaugh, vice-president.

"Cancellation of this production is in line with our stated policy, made when we went into iron production, that we would not allow civilian goods manufacture to interfere with our war contracts. In September, the month we resumed iron production, the war news looked mighty good," Mr. Ashbaugh stated.

"Now with prospects for a speedy victory less bright, new orders for urgently needed war goods and advanced schedules in this plant will soon require employment greater than at any time since Pearl Harbor.

## *uffalo Inaugurates Worker Voluntary Loans Plan for Must Plants*

*uffalo*

• • Voluntary "loans" of male orkers in "non-essential and less-es-ntial" industries to "must" war lants were inaugurated in the Buf-lo area recently under the direction the War Manpower Commission.

The Area War Manpower Commit-e approved a four-point plan for oluntary" action at a stormy ses-on on Friday, when Mrs. Anna M. osenberg, WMC regional director, ld the committee the alternative as drastic government sanctions.

The plan calls for:

1. A program of "education and persuasion" for transfer of needed workers for non-essential to essential lines.

2. Penalties in the form of economic sanctions, shutting off materials and supplies, against employers who refuse to comply.

3. Hearings of charges that some plants on the WMC priority list are not utilizing present personnel to the fullest extent.

4. Safeguarding of shifted workers' seniority and union rights and measures to provide for reinstatement when the emergency is over.

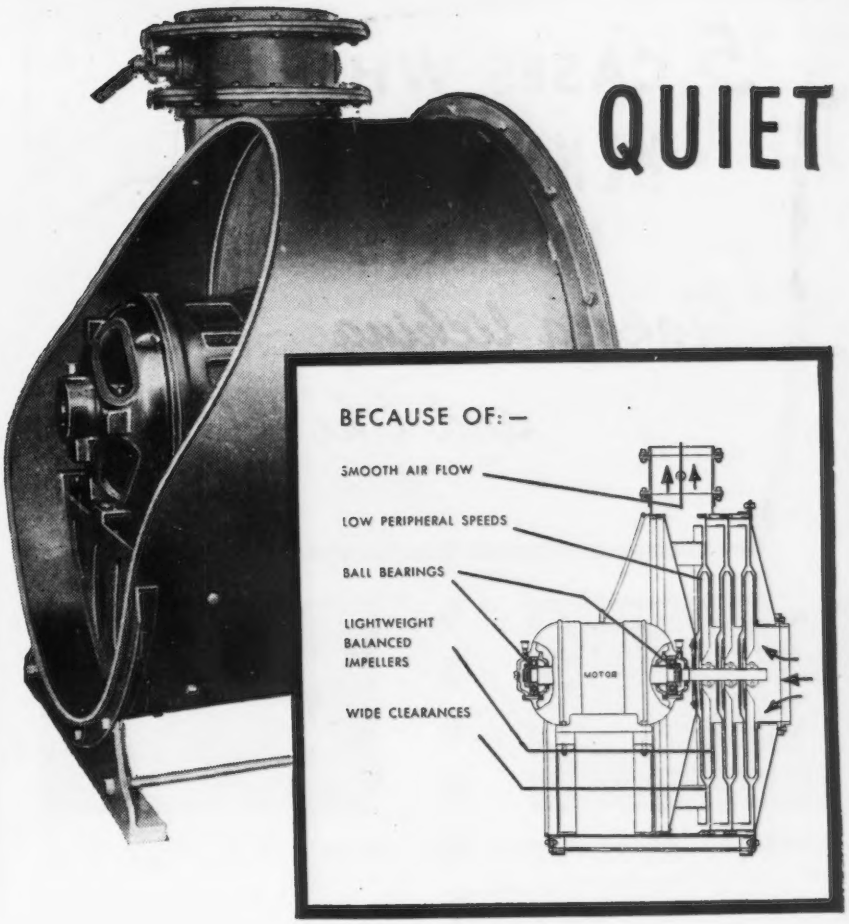
Declaring the time for "pulling unches" is past, Mrs. Rosenberg and group of military leaders told the ommittee that "certain contracts ust be filled here because there is no ther place they can go."

"We will have to cut combat mis-ions on both the Eastern and West-rn fronts 25 to 30 per cent if Buffalo rea plants fail to live up to full com-itments for the Air Forces," said ol. Kenneth Collins, commanding of-icer of the Eastern District, Air echnical Service Command.

The Navy announced an increased ocket program in the area had oosted contracts at least 2000 per ent over October, 1944.

Summing up the manpower needs, Mrs. Rosenberg said there are 17 lants working on "top must" orders hich require about 2000 additional orkers and plants on "critical" or-ers require another 4600, while "es-ential" plants need 7000 more.

Charges of Hugh Thompson, CIO egional director and a member of the rea War Manpower Committee, that 5 of the 17 "must" plants actually eeded no more workers if they made roper utilization of those already on heir rolls resulted in sharp ex-


Spencer Turbos deliver large volumes of air with constant pressure regardless of load.

Besides the points indicated above, Spencers are simple as an electric fan, have only two bearings, and a one-piece, all-metal casing, reinforced by ribbed end sections. A bridge-like casting supports the motor and rotating elements and evenly distributes the weight

There's a QUIET Spencer Turbo of the exact volume and pressure you need. You can mount it anywhere without special foundations. The discharge can be arranged for any one of four positions. It will serve you well for a lifetime.

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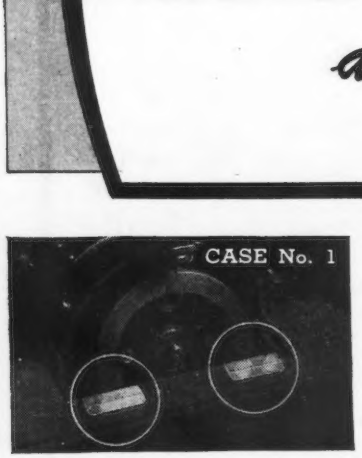
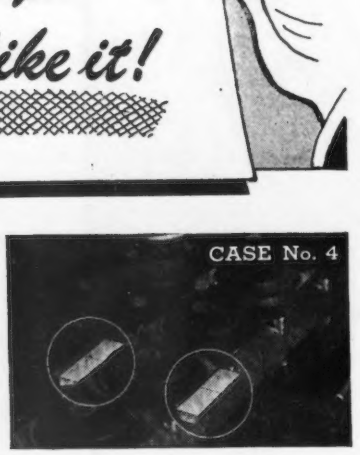
TURBO-COMPRESSORS

# 5 CASES WHERE KENNAMETAL INSERTS *Take a licking and like it!*



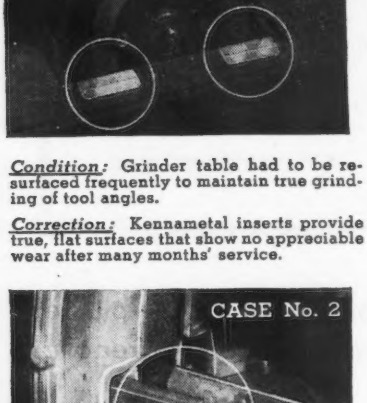

*Condition:* Grinder table had to be resurfaced frequently to maintain true grinding of tool angles.

*Correction:* Kennametal inserts provide true, flat surfaces that show no appreciable wear after many months' service.



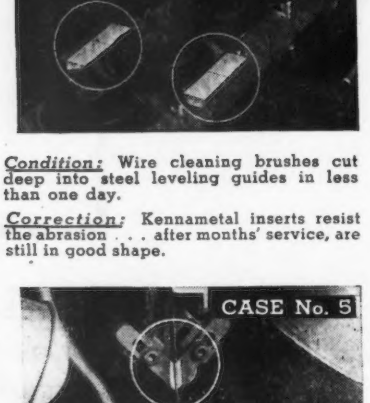

*Condition:* Wire cleaning brushes cut deep into steel leveling guides in less than one day.

*Correction:* Kennametal inserts resist the abrasion . . . after months' service, are still in good shape.



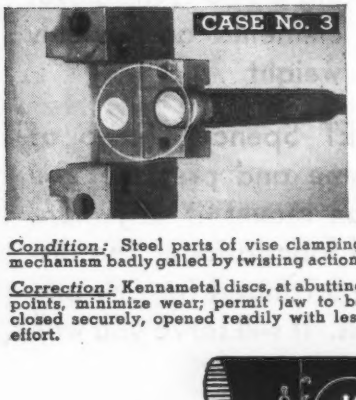

*Condition:* Worn sliding surfaces of abrasive saw rest allowed shank steel to wobble, causing uneven cut-off.

*Correction:* Inserts of Kennametal make smooth surface that outwears steel up to 100 times.




*Condition:* Steel surfaces of band saw guides wore quickly, allowing saw to weave and cause uneven profiling.

*Correction:* Inserts of wear-resistant Kennametal provide non-galling surfaces that guide the saw straight and true.




*Condition:* Steel parts of vise clamping mechanism badly galled by twisting action.

*Correction:* Kennametal discs, at abutting points, minimize wear; permit jaw to be closed securely, opened readily with less effort.

## *WHAT'S YOUR CASE?*

If the service life of your products or production machinery is shortened by excessive wear . . . incorporate extremely hard, non-galling Kennametal parts at critical points. Kennametal is available in a variety of standard shapes (balls, discs, flat blanks), and it can be molded into almost any special form, limited only by reasonable proportions. Write for catalog information.

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changes. Subsequently the committee voted to open hearings on Thursday with representatives of the management and the union involved in each plant attending to state their cases.

Mrs. Rosenberg told the committee that every effort would be made to remedy "hoarding" conditions wherever they are found, but that meanwhile immediate action was necessary.

"The period for nursing the situation along is over," she declared. "There is male labor in less essential industry which women can do—and even if these industries and services have to be curtailed, the war effort won't suffer. We still lack heavy-industry labor.

"We finally succeeded in making it possible for wages in forge shops and foundries to be raised. But what good is it, if the companies won't take advantage of it? We've even found some companies which haven't increased wages the allowable 15 per cent."

The worker-transfer program "is going to be tough for labor and tough for industry," Mrs. Rosenberg conceded, adding that "it can be done on a cooperative basis."

While answers to questionnaires sent to 18,000 employers in the area disclose that many "non-essential" plants have male workers which can be used in "essential" war work, she said "there still won't be enough heavy industry labor to meet the demands."

"There is only one answer," she asserted. "That is the use of Jamaicans and war prisoners. There is no turnover with Jamaicans and no absenteeism with war prisoners. And the turnover and absentee figures are much too high in Buffalo."

## *Big Industries Urged To Advise Small Ones*

***Buffalo***

• • • **Large industries** should provide advice and counsel for small companies to preserve "little business" in the postwar era, William Shepherdson, director of the Postwar Small Business Credit Commission, American Institute of Banking, told more than 250 businessmen and bankers of western New York here recently.

Declaring that lack of sound management talent is the major handicap of most small business, he said "if the government provides socialized service and assistance to small business, it will be because private initiative has failed in its efforts.

## *Survey Shows November Earnings for Industry Workers Reached Peak*

*New York*

• • • **Average weekly earnings** of wage earners in the 25 manufacturing industries surveyed each month by the National Industrial Conference Board were at an all-time peak of $49.46 in November, while hourly earnings regained their October loss to equal the record September level of $1.08.

The four highest averages were shown for the following industries: Automobile, $58.24; iron and steel, $57.34; rubber, $58.06; and foundries and machine shops, $57.08.

The changes in payroll statistics from October to November as shown by the Conference Board's survey are summarized as follows:

Hourly earnings rose 0.1 per cent to $1.080. They were 3.7 per cent higher than in November, 1943, and 42.3 per cent above the level of January, 1941, base date of the Little Steel formula.

Weekly earnings at $49.46 were 0.1 per cent higher in October, 4.0 per cent above those of November, 1943, and 61.6 per cent above January, 1941.

Real weekly earnings, or dollar weekly earnings adjusted for changes in living costs, declined 0.2 per cent in November. They were 2.1 per cent greater than in November, 1943, and 32 per cent above January, 1941.

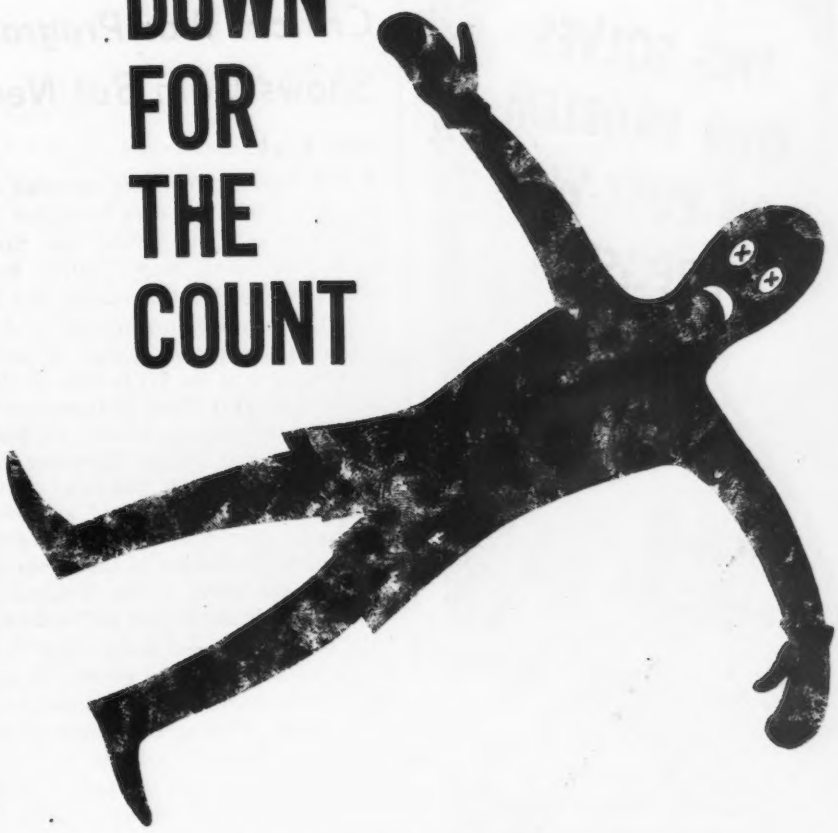
Hours worked per week averaged 45.6, or 0.2 per cent less than in October. The average was 0.1 hr., or 0.2 per cent, above November, 1943, and 5.4 hr., or 13.4 per cent, above January, 1941.

Employment in the 25 industries declined 0.5 per cent in November, the twelfth consecutive monthly decline. It was 10.6 per cent below November, 1943, but 23.1 per cent alove January, 1941.

Man hours worked in the 25 industries declined 0.8 per cent and were 10.4 per cent below November, 1943. They were, however, 39.7 per cent above January, 1941.

Payrolls in November fell off 0.3 per cent and were 7.0 per cent below those of November, 1943. They were 99.1 per cent higher than in January, 1941.


# DOWN FOR THE COUNT



When Wyandotte Metal Cleaners step into the ring, the odds are all against that plug-ugly "Fabricating Compound". For each of these products is a specialist at handling the toughest metal cleaning and degreasing jobs.

Their "manager" is the Wyandotte Representative. He has a cleaner to fill every need—for cleaning after machining and prior to plating, painting, lacquering, blackening, anodizing or spot-welding operations. His products will save you time, money, labor and rejects. Even in the most delicate and precise cleaning operations, they're safe on any surface.

Don't hesitate to call your Wyandotte Representative at any time. Backed by Wyandotte research and experience, he'll gladly study your process and help you get cleaning jobs done quickly and efficiently.

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# Critical War Program Output Shows Gain But Needs Will Increase

*New York*

• • • **Large gains were recorded** in January production over December in the dozen or more critical war programs and even larger output has been scheduled for this month. While actual percentages are restricted, Lt. Col. J. R. Naylor, in charge of critical programs of the WPB under H. G. Batcheller, WPB Chief of Operations, speaking before a conference on War Production and Future Planning in New York on Jan. 30, named as critical items: Certain types of aircraft, mortars, heavy field artillery, heavy ammunition, rocket shells, tanks, heavy trucks, light heavy trucks, communication wire, batteries and cotton duck.

New facilities are being built for extending production on some of these items, like mortars and rockets, but in all cases shortages of manpower and materials must be faced.

Contrasting conditions today with those of three years ago, Colonel Naylor said that in the early days of the war, critical programs were in relation to the needs of armed forces not yet in combat and were based on intelligent estimates and experiences. "Today," he said, "we don't plan. All that we need is an adding machine to total the demands coming in daily from the field and the fleets. Even estimates based on battle needs are not valid beyond 30 days. The enemy constantly keeps changing the requirements. Frequent changes in design of aircraft and ordnance material is one of the factors that complicates the expediting of critical programs," he said.

He urged his audience of 1300 engineers to eliminate the word "conversion" from their vocabulary until the war is totally won. Reconversion will be taken in stride, Coloned Naylor said and predicted that six months after the war has stopped, industry will be on a full peacetime basis. In the meantime he urged all out effort toward producing war goods, indicating that a long war in Asia could be expected. The Japanese have moved so much heavy equipment to the mainland that they can readily maintain an army of 4,000,000 men in China for some time. For this reason, he saw a long and hard war in the Orient after Germany had been defeated, that would tax our full productive capacity.

# Canada to Up Essential Steel Output

*Toronto*

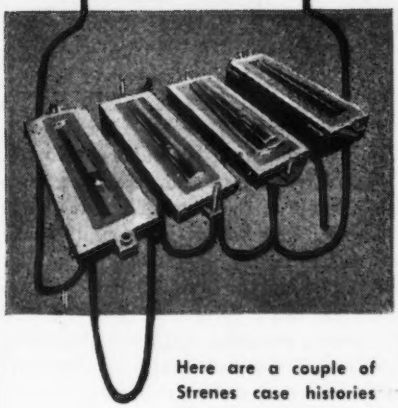
• • • **Despite the fact that heavy** pressure is being maintained on Canadian steel producers to supply war industry, government circles announce that the manufacture of certain essential civilian goods will be stepped up this year. Officials of Wartime Prices & Trade Board state that permits have been issued for 30,000 washing machines to be produced in Canada in the first six months of this year.

For the full year 1944, 24,000 washing machines were turned out in Canadian plants, but many of these machines were dependent upon United States components. This year, however, it is not expected that washing machine components will be available from the United States due to the tightening in priority, materials and manpower in that country.

As a result of the conditions across the line which will shut out parts shipped into this country, plans are underway for the manufacture of washing machine components in Canada. It is pointed out, however, that if Canadian plants do proceed with the manufacture of components, this type of equipment may be standardized and will be interchangeable for use in the various types of washing machines. It is further pointed out that if wringer parts are standardized or made interchangeable it would also enable producers to reduce their costs to figures comparable to those prevailing in the United States.

While Wartime Prices & Trade Board will permit the manufacture of 30,000 washing machines this year, there is no guarantee that this many machines will be turned out as there will still be the problem of raw material supply as well as the labor question. At the present time manufacturers are licensed to turn out vacuum cleaners and electric stoves but so far they have been unable to produce to the total of their license. It is understood, however, that there will be some increase in production in the first half of this year.

# STRENES METAL POINTS THE WAY



Here are a couple of Strenes case histories that may suggest a way to reconvert to civilian production a little faster.

**Tractor Top-Dies**

Strenes Metal—cast-to-shape—was specified for stamping tractor hood tops. An accurate cost check showed a saving of around 50% in machining time due to the cast-to-shape construction. On reconversion tooling rush, such a saving will be highly advantageous.

**Hydrator Pan Die**

Dies of Strenes Metal stand up, too. One refrigerator hydrator pan die, for instance, stamped 2,000,000 parts with a 3½" draw out of .50 material. And, due to the self-lubricating property of the metal, stoning and polishing operations were virtually unnecessary.

Both for civilian and war products, Strenes Metal has been a definite help on many tooling programs. Facts and figures on request. Write today.

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Strenes METAL


NEWS OF INDUSTRY

## *UE-CIO Offers New Veterans' Proposals*

*New York*

• • • **In contract proposals** submitted to the General Electric Co. and the Westinghouse Electric & Mfg. Co. prior to regular annual contract negotiations, the United Electrical, Radio & Machine Workers of America, CIO, provided for clauses which extend seniority privileges to all veterans of this war whether previously employed by these companies or not for the length of service in the armed forces back to Sept. 1, 1940, Julius Emspak, general secretary, announced Feb. 2.

These provisions do not insure the availability of jobs, Mr. Emspak said. They would be operative only under existing conditions.

The seniority rights would extend for the veteran's period of military service and would start, for a newly-hired employee, only after the veteran has obtained a job and has satisfactorily fulfilled the usual trial period.

Principal features of the proposals are the granting of seniority rights to newly hired veterans; securing employment for disabled veterans through the joint action of the union and company in the community, and the guaranteeing of any wage increases granted during the employee's period of military service.

At present, approximately 60,000 veterans are involved, 40,000 formerly employed at General Electric and 20,000 at Westinghouse. The union will attempt to make this retroactive to those who already have been discharged from the armed services and are now employed at either of the two companies.

## *National Income Now At Record High Rate*

*New York*

• • • **For the first eleven** months of 1944, the national income totaled $136,768,000,000 as compared with $135,474,000,000 in the corresponding period of 1943, an increase of 1.0 per cent, according to the Alexander Hamilton Institute. Although preliminary information affords evidence that the national income in December was smaller than in November, it is probable that it did not decline much, if at all, below the level of December, 1943. This indicates that the annual national income in 1944 was larger than in 1943 and thus reached a new high record.


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# Searles Lake Becomes Major Lithium Source

***Trona, Calif.***

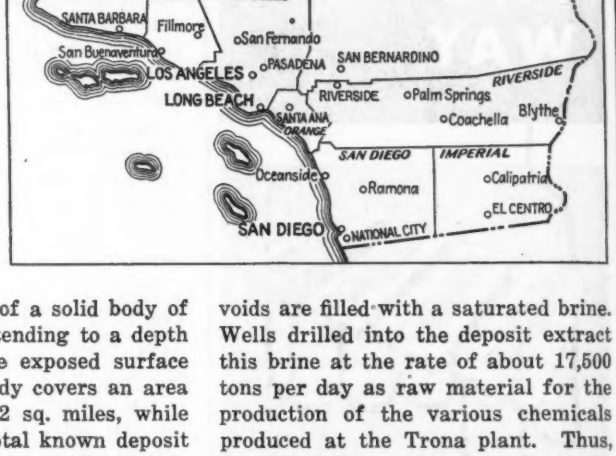
• • • Searles Lake, located on the edge of the Mojave Desert near the northwest corner of San Bernardino County, Calif., has long been a source of borax, potash, soda ash, sodium sulfate, bromine and other chemicals. Only recently, however, has it been exploited for its lithium values. Previously, all lithium compounds were produced from various complex lithium ores, but since 1938 the production of lithium compounds in the United States has been increased by the entry of the American Potash & Chemical Corp. of Trona, Calif., into the ranks of primary lithium salt producers.

Searles Lake is in reality a desert salt-pan or playa. Following infrequent rains it may be covered with a few inches of water, but during most of the year the salt surface is dry and will easily support the weight of heavy vehicles. For the most part, the "lake" consists of a solid body of crystalline salts extending to a depth of 60 to 90 ft. The exposed surface of the main salt body covers an area of approximately 12 sq. miles, while the extent of the total known deposit is about 30 sq. miles, containing possibly 100,000,000 tons of alkali salts per square mile.

The porosity or proportion of voids in the salt body has been variously estimated at 25 to 45 per cent. These voids are filled with a saturated brine. Wells drilled into the deposit extract this brine at the rate of about 17,500 tons per day as raw material for the production of the various chemicals produced at the Trona plant. Thus, Searles Lake constitutes one of the country's greatest single stockpiles of available raw materials for present-day American chemical industry.

Searles Lake brine has long been known to carry small amounts of lithium in solution, but it was not until 1938 that a very limited recovery of a new crude lithium compound was commenced at the American Potash plant as an incidental co-product of other operations. This lithium "concentrate," having a composition approximately represented by the formula $Li_2NaPO_4$, has found a ready market due to its extremely high lithium content (19 to 21 per cent $Li_2O$) in comparison with the best lithium ore concentrates available for further refining. For the manufacture of other lithium compounds, it is unexcelled due to the ease with which it can be processed.

The brine entering the Trona plant contains approximately two tons of $Li_2O$ per day equivalent to ten tons of the compound $Li_2NaPO_4$. Not all of the material is available for recovery, considerable quantities being inevitably lost in the general plant operations and through occlusion as a trace impurity in the various plant productions which aggregate over 450,000 tons annually. However, when wartime needs for lithium were found to greatly exceed the domestic output capacity, an extensive research project was initiated by the American Potash early in 1942, aimed at a substantially increased recovery of this material. As a result of this work a new process was developed and tried out on a pilot plant scale during 1943.




NOTE: *The "X" on map shows location of Searles Lake in San Bernardino County, Calif.*

**MACHINED BRONZE BEARINGS**
**GRAPHITED AND OILLESS**
**BRONZE BEARINGS**
**BRONZE GEAR BLANKS**
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**INDUSTRIAL BEARINGS**

**S. & H. Bearing and Manufacturing Co.**
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# South American Industrialization To Mean Heavy U. S. Railroad Purchases

***Eddystone, Pa.***

• • • **Industrialization of the South** American Republics will mean heavy purchases of railroad equipment in this country, including locomotives, cars, and rails, according to C. E. Kraehn, assistant to the vice-president of Baldwin Locomotive Works. He recently completed a tour of the South American countries, surveying present and postwar equipment needs for the industrialization now getting under way.

Heavy freight traffic during the war years is wearing out existing equipment at a rapid rate, and needs will be heavy to bring the present roads back to prewar level. Most of the locomotives and cars now in use were built in the twenties or earlier, and Mr. Kraehn described finding locomotives 43 years old still in regular freight use.

The need for locomotives is described as acute, and the prospect is that shipments will continue, although one of the largest potential markets, Argentina, will get no aid because of the political complexion of that country. A change in state department policy on that country would open the way for considerable business there.

The South American railways are of two principal gages, the meter gage common in mountainous regions, and the American standard, common in the comparatively flat areas. Most of the rails are light weight, suitable for light weight equipment, and it appears doubtful if vast replacements will be made in the near future, although their desirability is increasingly recognized. It is expected that when materials become available, there will be considerable expansion of existing lines, requiring additional new equipment as well as rails.

According to Mr. Kraehn there is considerable interest in the development of steel mills and manufacturing plants for the production of maintenance parts, particularly in Brazil where a company was formed Sept. 1 for this purpose.

In Chile, where the long range industrialization program is slightly behind schedule, a vast hydro-electric power system is underway, part of a rail system has been electrified, and it is contemplated that increased power development will expand this trend. Chileans hoped to obtain a steel mill in the United States this year to be located in Abinico, but the Foreign Economic Administration has not approved his plan for the present, although plans for American aid in the power development have been approved.

Limited supplies of coal available in Chile make the hydro development important to the economic development, and will pave the way for electrochemical plants now being contemplated for postwar development. Chileans are particularly anxious to expand their present two product economy, depending on nitrates and copper.

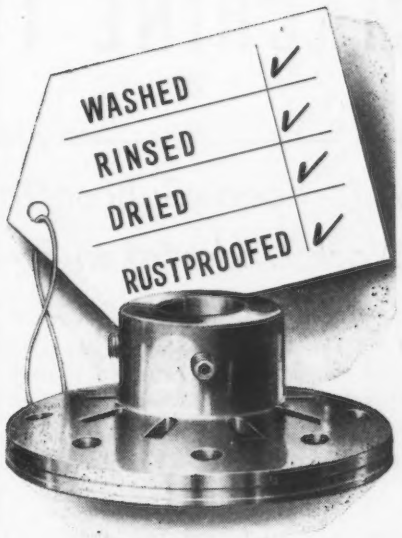
Important to the industrial development of all the South American nations will be the financial structure used. In Colombia, Mr. Kraehn related, the national corporation furnish 51 per cent of the original cost of any project, the state pays 24 per cent and the city the remainder. After the project is completed, the national corporation then sells its interest to the public and reinvests the funds in successive projects. He feels that some similar plan will become general practice with most of the countries.

## Shell Output in '44 Doubled at Bethlehem

***Bethlehem, Pa.***

• • • **Bethlehem steel** production of shells in 1944 was 106 per cent above 1943, or more than double, according to E. G. Grace, president, in a statement recently. It was also revealed that the company's steel output for the past year was 13,262,348 tons, an increase of almost a quarter million tons over the previous high in 1943.

Bethlehem's shell production ranges from the 75-mm APC (armor-piercing capped) to the big 16-in. AP's which are about 6 ft. in height. Two new plants have recently been constructed to step-up production still further and they are now in operation. Another new war development is that Bethlehem has a huge program of producing rocket forgings on a schedule of "many hundreds of thousands per month."


4 operations 1
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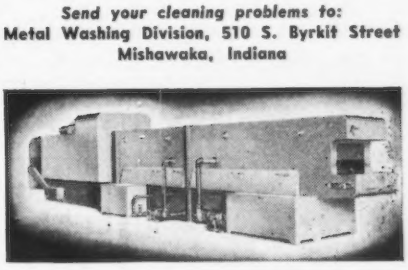
The Conveyor-Spray Machine can be used to wash, rinse, dry and rustproof miscellaneous work. This machine is composed of units, therefore, it can be expanded to suit variations in production set-ups. Starting with a Wash only, a Rinse can be added, then a Dryer and a Rustproofing unit. Any other combination of units is available.

**INCREASED PRODUCTION**— The special conveyors and arrangement of engineered power sprays with nozzles on top, bottom and sides gives complete coverage. This—coupled with ease of inspection, loading and unloading—speeds production so that costs are cut.

**LOW COST** — Life of cleaning solution is extended by Duplex straining devices; man-sized doors facilitate maintenance and keep operating costs at a minimum. Send us your problems, we will test-clean your work in our laboratories and give you data on how to lower your cleaning costs. Take advantage of our complete metal cleaning engineering service.

*Send your cleaning problems to:*
**Metal Washing Division, 510 S. Byrkit Street Mishawaka, Indiana**



CONVEYOR-SPRAY

American
FOUNDRY EQUIPMENT CO.

MISHAWAKA, INDIANA

# MACHINE TOOLS

. . . News and Market Activities

## Additional Subcontracting Work Undertaken By Tool Builders

*Cincinnati*

• • • The Lodge & Shipley Machine Tool Co. is now operating a special products division where transfer cases for trucks required for war uses are being processed and manufactured on a sub-contract basis.

The Lodge & Shipley Co. opened a subsidiary unit—removed from its machine tool plant, for production of the transfer cases which are integral components necessary to enable military wheeled vehicles of many types to overcome obstacles of terrain and off-the-road land condition.

Besides the transfer cases being supplied to such well-known truck and transport manufacturers as Mack, Brockway, Diamond T, Corbitt, White and Ward-LaFrance, as Special Products Division has also engaged in production of parts for aircraft propellers and aircraft electric motors. However, 85 per cent of current production is devoted to transfer cases.

The Lodge & Shipley contract is a sub-contract from the Standard Steel Spring Co., which in turn has a subcontract from the Timken Detroit Axle Company. The Timken master design is used at the Cincinnati plant.

A Lodge & Shipley-produced transfer case may see service in several different types of fire truck, ambullances, wreckers, or transport vehicles carrying men or ammunition to the front lines.

The transfer case is described as an auxiliary gear box which transfers the drive from the center line of the engine clutch and transmission to the offset center line of the propeller shafts necessary on all trucks equipped with front driving axles because the front axle propeller shaft is located alongside the engine oil pan or directly underneath the pan.

Transfer cases produced by Lodge & Shipley's special unit are provided with a power take-off to supply power for cranes, winches and other special equipment mounted on or built into various types of vehicles. Two-power ranges are also supplied for application whether conditions are on level roads or hilly terrain.

While all the castings, gears, and shafts are machined at the Special Products Division, various smaller parts such as screws and nuts are shipped in from various states, including Illinois, Missouri, Pennsylvania, Kentucky, Ohio, Wisconsin, Vermont, Indiana, California and others.

o o o

## Placement of Unrated Orders for Certain Machinery Prohibited

*Washington*

• • • Eliminating all orders appearing on List A of PR-24, WPB has barred the placement of unrated or non-authorized orders for certain kinds of machinery and equipment. This action was taken to prevent interference with the use of manpower, facilities and materials for urgently needed war production. In taking future action, when conditions permit, WPB said it expects to reinstate on List A orders.

It was pointed out that unrated or non-authorized purchase orders for orders affected by the amendment to PR-24 may be retained on purchasers' books, but must be treated as orders scheduled for delivery when applicable restrictions are modified to permit delivery.

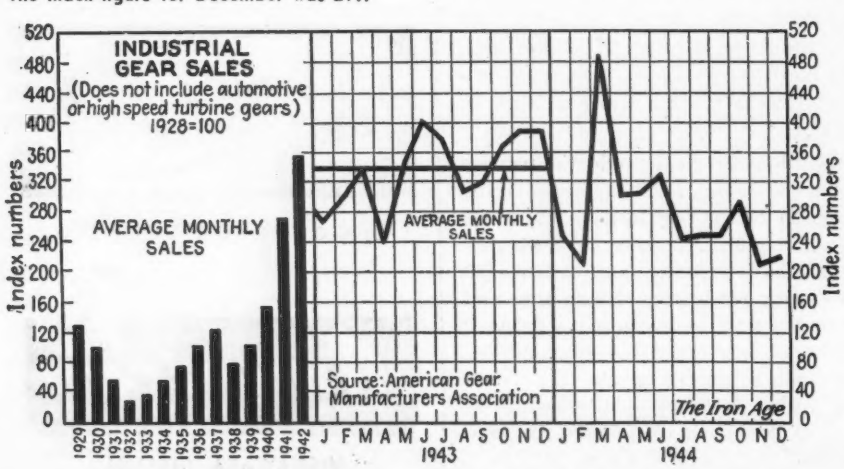
Manufacturers who are now producing or have planned to produce in the future on unrated or non-authorized purchase orders under the provisions of PR24, will be expected to cut back any purchase orders they have placed for components, parts and materials to conform to applicable WPB inventory regulations, WPB said. Provisions of the regulation that permit applications for preference ratings on Form WPB-1319 for equipment and machinery needed for civilian production or performance of civilian services are not affected by the amendment.

Orders affected by this action, together with the types of equipment and machinery covered, follow:

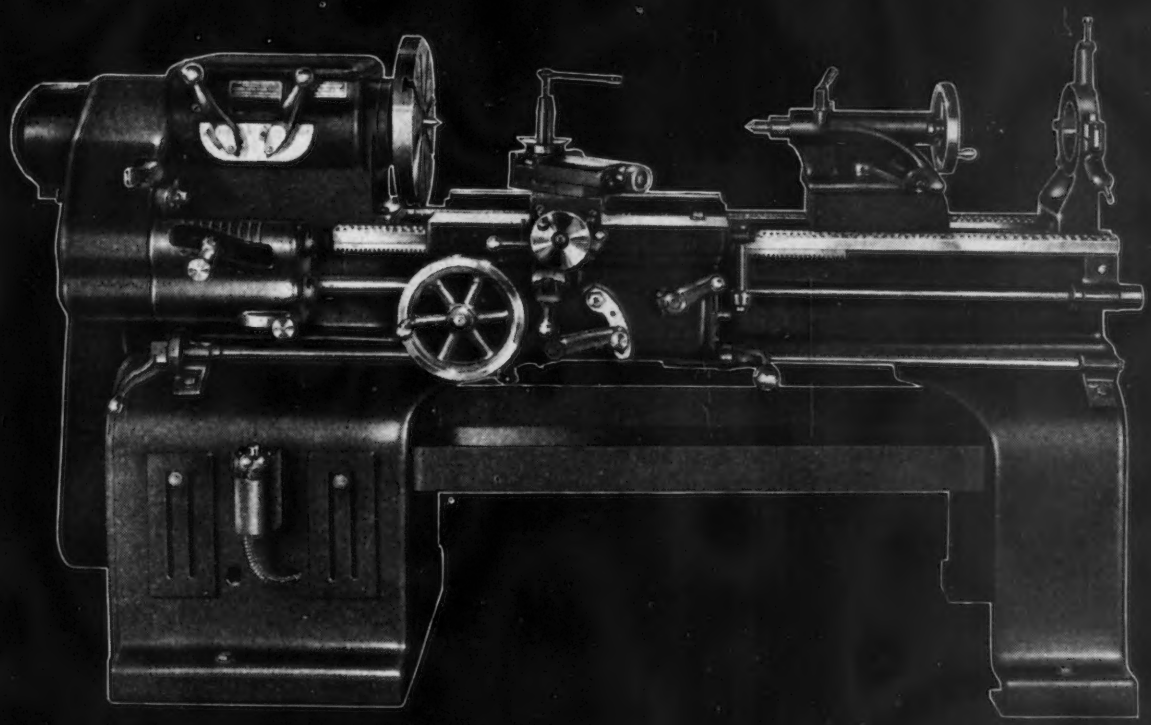
L-89, Elevators and escalators; L-123, General industrial equipment; L-193, Conveying machinery and mechanical power transmission equipment; L-221, Electric motors and generators; L-226, Printing trades machinery; L-250, Electric motor controllers; L-298, Resistance welding equipment; L-311, Logging, lumber and wood products machinery and equipment.

### December Gear Sales Increase

. . . The gearing industry, as represented by the members of the American Gear Manufacturers Association, shows an increase in volume of sales for December, as compared with November, of 4.5 per cent. This report does not include turbine or propulsion gearing. The index figure for December was 219.



Through fifty-seven years of specializing exclusively in lathe manufacturing the trade-wise have learned that the name SEBASTIAN means more value for their lathe-purchasing dollar.



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# SEBASTIAN LATHES

*Manufactured by*

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**CHICAGO, ILLINOIS**
541 WEST WASHINGTON BLVD.
*Tel.:* STATE 3092

# NON-FERROUS METALS

**. . . News and Market Activities**

## WPB Limits Aluminum Stocks To 30-Days' Supply During Shortage

*Washington*

• • • **WPB has announced** that inventory restrictions applicable to users of aluminum sheet, strip and plate have been tightened because of heavy demands for these forms of the metal in aircraft production. Under the new rule, a user of 10,000 lb. or more a month is not permitted to accept delivery of any item of aluminum sheet, strip or plate if his inventory is or would become because of such acceptance in excess of the quantity of such item he requires during the succeeding 30 days for authorized production. Users previously were limited to a 60-day supply.

This rule, which is contained in Direction 21 to CMP Regulation 2, does not apply (1) to any aluminum sheet, strip or plate in transit or loaded for delivery on Feb. 5, or (2) to aluminum sheet, strip or plate that is shipped by a producer (but not a warehouse) prior to March 1. The second exception to the general rule has been included to permit mills to continue operation on schedules that have, in most cases, already been planned for February.

Users are required to cancel or modify their outstanding orders for aluminum sheet, strip and plate in order that they shall conform to the requirements of the new direction.

o o o

## Reynolds Expands Its Aluminum Research

• • • **The Reynolds Metals Co. is establishing a research** organization at the former Woolworth estate, Glen Cove, Long Island, New York. Here the research activities carried on at the various plants heretofore will be centralized and coordinated.

The facilities will comprise a modern laboratory and administration building which will also house a library and information center for the research staff. There will be specialized equipment for refrigeration, quick freezing, and further studies of the use of aluminum foil in food and drug packaging. The center is expected to afford facilities for scientific and engineering research for all Reynolds companies and for users and prospective users of Reynolds products.

A staff of about 150 technicians is contemplated. Dr. Warren J. Mead, head of the Geology Department of M.I.T., has been appointed director of research. Associated with him will be Reid B. Gray as director of development, formerly director of the Glenn L. Martin Co. testing laboratory; Dr. Richard J. Lund in charge of basic research, former head of the Miscellaneous Minerals Division, WPB; and Dr. Samuel C. Prescott as consultant on food technology, M.I.T. bacteriologist.

Reynolds Metals Co. is reputed to produce nearly 25 per cent of all domestic aluminm. Today, this company, a comparative newcomer to the field, produces more aluminum than did the United States, England and France combined in 1939.

•

## Will Expand Market For Clad Wire Conductor

• • • **In order to expand the market for a special clad wire** composed of a core of copper bonded into a sleeve of nickel in the weight ratio of 70 to 30 per cent, respectively, Callite Tungsten Corp., Union City, New Jersey has already cut its costs on this product and is engaged in further studies toward this end.

Developed originally to be welded to tungsten filaments for light bulbs and electronic tubes, the wire is being used by the Army Signal Corps, and proposed for use as a lead-in to electrified blankets, heating pads, and other commercial heating elements were oxidation, embrittlement or corrosion is present.

Identified as Kulgrid, this clad metal is available in rod form, or in single and stranded wire in any gage down to 0.006 in. It can be used where an electrical conductor is needed to withstand high temperatures and corrosive conditions. It is said that this wire can be heated to a cherry red without losing flexibility. Its tensile strength is said to be more than four times greater than that of copper, while possessing 70 per cent of its electrical conductivity.

This wire product is produced by shrinking a nickel tube on a copper rod, followed by subsequent cold drawing to size.

•

## Produce More Tungsten For Filament Use in War

• • • **Production of tungsten for electric** lamps and electronic tubes is now 16 times greater than in prewar years, Ralph C. Stuart, manager of the Westinghouse Lamp Division said recently. When Thailand, our source for some of the tungsten ore wolframite, had fallen to the enemy and labor shortages had limited supplies from Australia, the government took control of imports shortly after Pearl Harbor. Meantime Chinese wolframite had to be flown to a seaport for shipment after the blockade of the Burma Road and tungsten began to be allocated in January, 1943.

Tungsten has been refined by Westinghouse from high grade wolframite since 1907 in Bloomfield, N. J. The processing of molybdenum by Westinghouse from ammonium molybdate crystals started four years later.

These metals are reduced to powder at the Westinghouse plant, compressed into ingots and then drawn into fine gage wire. Both metals have a high melting point and an electrical conductivity about 1/3 that of copper. They compare favorably with some more expensive metals in their ability to resist corrosion. Strength and a high melting point—6098 deg. F.—permit tungsten filaments down to 0.0002 in. dia.—the finest tungsten wire made, to be sturdy and resist sagging. Molybdenum, no more than half as strong and melting at 4728 deg. F., is used by the lamp division primarily as support wires for filaments, and for lead-in wires, plates and grids in electronic tubes.

According to Mr. Stuart, domestic deposits of tungsten ore in California and Colorado are not suited for lamp and tube manufacture, which requires tungsten of 99.9 per cent purity.

## Primary Metals

*(Cents per lb., unless otherwise noted)*

| | |
|---|---|
| Aluminum, 99+%, del'd. (Min. 10,000 lb.) | 15.00 |
| Antimony, American, Laredo, Tex. | 14.50 |
| Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be. | $17.00 |
| Cadmium, del'd | 90.00 |
| Cobalt, 97-99% (per lb.) | $1.50 to $1.57 |
| Copper, electro, Conn. valley | 12.00 |
| Copper, electro, New York | 11.75 |
| Copper, lake | 12.00 |
| Gold, U. S. Treas., dollars per oz. | $35.00 |
| Indium, 99.5%, dollars per troy oz. | $4.50 |
| Iridium, dollars per troy oz. | $120.00 |
| Lead, St. Louis | 6.35 |
| Lead, New York | 6.50 |
| Magnesium, 99.9 +.%, carlots | 20.50 |
| Magnesium, 12-in. sticks, carlots | 27.50 |
| Mercury, dollars per 76-lb. flask, f.o.b. New York | $165.00 to $175.00 |
| Nickel, electro | 35.00 |
| Palladium, dollars per troy oz. | $24 00 |
| Platinum, dollars per oz. | $35.00 |
| Silver, open market, New York, cents per oz. | 44.75 |
| Tin, Straits, New York | 52.00 |
| Zinc, East St. Louis | 8.25 |
| Zinc, New York | 8.65 |

## Remelted Metals

*(Cents per lb. unless otherwise noted)*

| | |
|---|---|
| Aluminum, No. 12 Fdy. (No. 2) | 9.00 to 10.00 |
| Aluminum, deoxidizing No. 2, 3, 4 | 6.00 to 9.50 |
| Brass Ingot | |
| 85-5-5-5 (No. 115) | 13.25 |
| 88-10-2 (No. 215) | 16.75 |
| 80-10-10 (No. 305) | 16.00 |
| No. 1 Yellow (No. 405) | 10.25 |

## Copper, Copper Base Alloys

*(Mill base, cents per lb.)*

| | Extruded Shapes | Rods | Sheets |
|---|---|---|---|
| Copper | 20.87 | .... | 20.37 |
| Copper, H.R. | .... | 17.37 | .... |
| Copper drawn | .... | 18.37 | .... |
| Low brass, 80% | .... | 20.40 | 20.15 |
| High brass | .... | .... | 19.48 |
| Red brass, 85% | .... | 20.61 | 20.36 |
| Naval brass | 20.37 | 19.12 | 24.50 |
| Brass, free cut | .... | 15.01 | .... |
| Commercial bronze, 90% | .... | 21.32 | 21.07 |
| Commercial bronze, 95% | .... | 21.53 | 21.28 |
| Manganese bronze | 24.00 | .... | 28.00 |
| Phos. bronze, A, B, 5% | .... | 26.50 | 26.25 |
| Muntz metal | 20.12 | 18.87 | 22.75 |
| Everdur, Herculoy, Olympic or equal | .... | 25.50 | 26.00 |
| Nickel silver, 5% | .... | 28.75 | 26.50 |
| Architect bronze | 19.12 | .... | .... |

## Aluminum

*(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)*

*Tubing:* 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

*Plate:* 0.250 in. and heavier; 2S and 3S, 21.2c.; 52s, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

*Flat Sheet:* 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

*Extruded Shapes:* "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

*Wire Rod and Bar:* Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 44c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

## Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

# NON-FERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

## Copper, Copper Base Alloys

### *OPA Group 1*†

| | |
|---|---|
| No. 1 wire, No. 1 heavy copper | 9.75 |
| No. 1 tinned copper wire, No. 1 tinned heavy copper | 9.75 |
| No. 2 wire, mixed heavy copper | 8.75 |
| Copper tuyeres | 8.75 |
| Light copper | 7.75 |
| Copper borings | 9.75 |
| No. 2 copper borings | 8.75 |
| Lead covered copper wire, cable | 6.00* |
| Lead covered telephone, power cable | 6.04 |
| Insulated copper | 5.10* |

### *OPA Group 2*†

| | |
|---|---|
| Bell metal | 15.50 |
| High grade bronze gears | 13.25 |
| High grade bronze solids | 11.50* |
| Low lead bronze borings | 11.50* |
| Babbitt lined brass bushings | 13.00 |
| High lead bronze solids | 10.00* |
| High lead bronze borings | 10.00* |
| Red trolley wheels | 10.75 |
| Tinny (phosphor bronze) borings | 10.50 |
| Tinny (phosphor bronze) solids | 10.50 |
| Copper-nickel solids and borings | 9.25 |
| Bronze paper mill wire cloth | 9.50 |
| Aluminum bronze solids | 9.00 |
| Soft red brass (No. 1 composition) | 9.00 |
| Soft red brass borings (No. 1) | 9.00 |
| Gilding metal turnings | 8.50 |
| Contaminated gilded metal solids | 8.50 |
| Unlined standard red car boxes | 8.25 |
| Lined standard red car boxes | 7.75 |
| Cocks and faucets | 7.75 |
| Mixed brass screens | 7.75 |
| Red brass breakage | 7.50 |
| Old nickel silver solids, borings | 6.25 |
| Copper lead solids, borings | 6.25 |
| Yellow brass castings | 6.25 |
| Automobile radiators | 7.00 |
| Zincy bronze borings | 8.00 |
| Zincy bronze solids | 8.00 |

### *OPA Group 3*†

| | |
|---|---|
| Fired rifle shells | 8.25 |
| Brass pipe | 7.50 |
| Old rolled brass | 7.00 |
| Admiralty condenser tubes | 7.50 |
| Muntz metal condenser tubes | 7.00 |
| Plated brass sheet, pipe reflectors | 6.50 |
| Manganese bronze solids | 7.35[1] |
| Manganese bronze solids | 6.25[2] |
| Manganese bronze borings | 6.50[1] |
| Manganese bronze borings | 5.50[2] |

### *OPA Group 4*†

| | |
|---|---|
| Refinery brass | 4.75* |

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

## Other Copper Alloys

| | |
|---|---|
| Briquetted Cartridge Brass Turnings | 8.625 |
| Cartridge Brass Turnings, Loose | 7.875 |
| Loose Yellow Brass Trimmings | 7.875 |

## Aluminum

### *Plant scrap, segregated*

| | |
|---|---|
| 2S solids | 8.00 |
| Dural alloys, solids 14, 17, 18, 24S | |
| 25S | 5.00 |
| turnings, dry basis | 3.25 |
| Low copper alloys 51, 52, 61, 63S solids | 7.00 |
| turnings, dry basis | 5.50 |

### *Plant scrap, mixed*

| | |
|---|---|
| Solids | 4.00 |
| Turnings, dry basis | 3.00 |

### *Obsolete scrap*

| | |
|---|---|
| Pure cable | 8.00 |
| Old sheet and utensils | 6.00 |
| Old castings and forgings | 5.00 |
| Pistons, free of struts | 5.00 |
| Pistons, with struts | 3.00 |
| Old alloy sheet | 5.00 |

## Magnesium*

### *Segregated plant scrap*

| | |
|---|---|
| Pure solids and all other solids, exempt Borings and turnings | 1.50 |

### *Mixed, contaminated plant scrap*

| | |
|---|---|
| Grade 1 solids | 3.00 |
| Grade 1 borings and turnings | 2.00 |
| Grade 2 solids | 2.00 |
| Grade 2 borings and turnings | 1.00 |

*Nominal.

## Zinc

| | |
|---|---|
| New zinc clippings, trimmings | 6.50 |
| Engravers, lithographers plates | 6.50 |
| Old zinc scrap | 4.75 |
| Unsweated zinc dross | 5.00 |
| Die cast slab | 4.50 |
| New die cast scrap | 4.45 |
| Radiator grilles, old and new | 3.50 |
| Old die cast scrap | 3.00 |

## Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

## Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

# ELECTROPLATING ANODES AND CHEMICALS

## *Anodes*

*(Cents per lb., f.o.b. shipping point)*

| | |
|---|---|
| Copper: Cast, elliptical, 15 in. and longer | 25½ |
| Electrolytic, full size | 22½ |
| cut to size | 30½ |
| Rolled, oval, straight, 15 in. and longer | 23¼ |
| Curved | 24¼ |
| Brass Cast, 82-20, elliptical, 15 in. and longer | 23½ |
| Zinc: Cast, 99.99, 16 in. and over | 16¼ |
| Nickel: 99% plus, cast | 47 |
| Rolled, depolarized | 48 |
| Silver: Rolled, 999 fine per Troy (1-9) oz., per oz. | 58 |

## *Chemicals*

*(Cents per lb., delivery from New York)*

| | |
|---|---|
| Copper cyanide, tech., 100-lb. bbls. 1-5 | 5.65 |
| Copper sulphate, 99.5 crystals, bbls. | 13.00-13.50 |
| Nickel salts, single, 425-lb. bbls. | 34.00 |
| Silver cyanide, 100 oz. lots | 40.82-41.125 |
| Sodium cyanide, 96% dom., 100-lb. dms. | 0.15 |
| Zinc, cyanide, 100-lb. dms. | 33.00 |
| Zinc, sulphate, 89% crystals, bbls. | 6.80 |

# SCRAP

**. . . News and Market Activities**

## Contamination of Scrap Plagues Mills

*Chicago*

• • • A new wave of mill rejections on the basis of alloy inclusions appears probable in view of operating difficulties experienced in the past six weeks. With scrap scarce and prices firm, mills generally have tended to relax the eagle-eyed vigilance which resulted in heavy rejections during the previous period of soft prices. However, operating difficulties and the sharp break experienced in the turnings market in the past fortnight presage a return to strict standards. While there is some talk that relaxation of OPA maximum price regulation No. 4 sections dealing with pricing of cars containing mixed grades may have abetted the contamination, certainly shortage of labor in the scrap yards has not helped the situation any.

The present complaint concerns the less desirable open hearth grades and even involves No. 1 heavy melting steel. Plants producing scrap are taken to task for failure to maintain standards of segregation. The mills

*For Scrap Zoning Plan News see p. 98.*

are meeting the necessity of using increased proportions of less desirable grades such as turnings in their open hearth charge to some extent by shipyard scrap allocated from the West Coast. A third major district producer now is receiving material from the Coast in addition to two mills previously reported.

Local extreme weakness in blast furnace grades is the subject of a tug-of-war between two opposing forces. Rapidly mounting shell production promises an abundance of supply for some time to come. Railroad embargoes have not affected the flow of coal to this district and hence to date there has been only the incentive of price to encourage increased use of turnings. As noted in the district summary, one relatively small mill purchase of blast furnace scrap was made last week.

*PITTSBURGH*—Scrap movement here due to a combination of the embargo and weather has dropped to a minimum. Paradoxical to the indications was the softening of turnings prices here during the past week. This is really only a reflection of the same thing in Chicago and Cleveland during the past month but, with scrap movement so slow, there shouldn't be a softening of prices in any grade. However, the supplies of turnings are in such quantities that they are not being used up.

•

*CHICAGO*—Purchase by a district mill of several hundred tons of short turnings and other blast furnace grades at $10.50 provides definite confirmation of price weakness of these grades. Until this sale, broker-dealer transactions provided the only indication of the price level of these grades. However, it is still problematical whether any large tonnage could be purchased at this price, and possibility of other mill transactions is being carefully watched. The price level of No. 2 and No. 3 bundles also remains nominal in the strictest sense of the term in view of absence of activity in these grades, but weakness in the turnings market serves as a barometer of prices weaker than those last quoted.

•

*DETROIT*—Turnings prices continued to slip downward this week with comparatively little interest in purchasing. Evidently the presence of accumulations made during December when many dealers were disinterested in selling because of tax considerations, continued to exercise a depressing effect on the market. Brokers report spotty inventory conditions at mills on melting steel, and shipments continue in fair volume.

•

*BUFFALO*—Steady advances of Allied armies have brought a rising note of caution into the scrap market and sales are not being made for extended delivery. Requirements for the current month are being covered at ceiling levels, but neither consumers nor dealers are inclined to make commitments beyond the first of March. Talk of the zoning plan also has been a factor in cooling bullishness. Under this system, it is pointed out, scrap from the eastern part of the district would come to Buffalo instead of going to Pittsburgh as has been the case recently. Bad weather and lack of freight cars continues to hold down the movement. One dealer who has shipped only one carload since the big storm of January 2 reported some foundries were getting sorely needed scrap by truck.

•

*BOSTON*—Not much scrap is moving to steel mills. Yards heretofore buried in snow have, in most instances, been put in workable order but business continues hampered by lack of manpower and freight cars. Foundries manage to keep going, but many are down to a week's supply of scrap or less. The cast scrap situation is acute. A lot of 200 tons of No. 1 machinery cast held in Worcester and sorely needed by foundries in that area, is to be melted into pigs to be used as ballast in hospital ships by order of the WPB.

•

*NEW YORK*—Movement of scrap in this area continues to be delayed by cold weather and ice on the ground. Dealers report that labor has been almost unobtainable due to the cold. All prices remain at ceilings. Mills are apparently concentrating on obtaining deliveries based on outstanding orders and are not placing further orders in volume at this time. The drop in prices of turnings in

•

*PHILADELPHIA*—With the embargo on shipments and lack of manpower to stockpile and prepare material in dealers' yards, the scrap business has been brought to a virtual standstill here. However, consumers' demands have increased and some are accepting promises of delivery withing 60 to 90 days instead of the usual 30-day period.

•

*CINCINNATI*—Rail embargoes combined with consumers' optimism on the war situation has tended to quiet the market. Dealers indicate that there is apparently a fair amount of material available, but shipping facilities combined with lack of manpower make it difficult to obtain scrap in sufficient quantities at the right time and place. Some softening of prices on machine shop turnings is noticed as a result of apathy on the part of consumers, the war situation appearing so bright.

•

*BIRMINGHAM*—Scrap dealers here, finding preparation of material an increasingly serious problem as a result of manpower shortages, are reported making little effort to accumulate stocks. Prices in this market are still firm although some indications of future weakness are beginning to appear with the encouraging developments on the battle fronts.

### Hyman-Michaels Officers

*Chicago*

**• • • Everett B. Michaels has been elected president of Hyman-Michaels Co. succeeding Sparrow E. Purdy, resigned. Michaels, who joined the firm upon his graduation from the University of Michigan in 1923, has been executive vice-president since July, 1942. Other officials elected are W. J. Ross, first vice-president; Walter Newman, vice-president; Clarence Wolf, assistant vice-president; William Rosenthal and H. L. Purdy, vice-presidents, and J. E. Michaels, secretary-treasurer.**

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

## PITTSBURGH

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $20.00* |
| RR. hvy. melting | 21.00* |
| No. 2 hvy. melting | 20.00* |
| RR. scrap rails | 21.50* |
| Rails 3 ft. and under | 23.50* |
| No. 1 comp'd sheets | 20.00* |
| Hand bdld. new shts. | 20.00* |
| Hvy. axle turn. | 19.00* |
| Hvy. steel forge turn. | 19.00* |
| Mach. shop turn. | $14.50 to 15.00 |
| Short shov. turn. | 16.50 to 17.00 |
| Mixed bor. and turn. | 14.50 to 15.00 |
| Cast iron borings | 16.00* |
| Hvy. break. cast | 16.50* |
| No. 1 cupola | 20.00* |
| RR. knuck. and coup. | 24.50* |
| RR. coil springs | 24.50* |
| Rail leaf springs | 24.50* |
| Rolled steel wheels | 24.50* |
| Low phos. bil. crops | 25.00* |
| Low phos. | 22.50* |
| RR. malleable | 22.00* |

## CHICAGO

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $18.75* |
| No. 2 hvy. melting | 18.75* |
| No. 1 bundles | 18.75* |
| No. 2 dealers' bndls. | $18.25 to 18.75 |
| Galv. bundles | 16.25 to 16.75 |
| Mach. shop turn. | 9.75 to 10.25 |
| Short shovel. turn. | 10.25 to 10.75 |
| Cast iron borings | 10.25 to 10.75 |
| Mix. borings & turn. | 10.25 to 10.75 |
| Low phos. hvy. forge | 23.75* |
| Low phos. plates | 21.25* |
| No. 1 RR hvy. melt. | 19.75* |
| Reroll rails | 22.25* |
| Miscellaneous rails | 20.25* |
| Rails 3 ft. and under | 22.25* |
| Locomotive tires, cut | 24.25* |
| Cut bolsters & side frames | 22.25* |
| Angles & splice bars | 22.25* |
| St'dard stl. car axles | 25.75* |
| No. 3 steel wheels | 22.75 to 23.25 |
| Couplers & knuckles | 23.25* |
| Agricul. malleable | 22.00* |
| RR. malleable | 22.00* |
| No. 1 mach. cast | 20.00* |
| No. 1 agricul. cast | 20.00* |
| Hvy. breakable cast | 16.50* |
| RR. grate bars | 15.25* |
| Cast iron brake sh's | 15.25* |
| Stove plate | 19.00* |
| Clean auto cast | 20.00* |
| Cast iron carwheels | 20.00* |

## CINCINNATI

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $18.00 to $18.50 |
| No. 2 hvy. melting | 18.00 to 18.50 |
| No. 1 bundles | 18.00 to 18.50 |
| No. 2 bundles | 18.00 to 18.50 |
| Mach. shop turn. | 8.50 to 9.00 |
| Shoveling turn. | 10.50 to 11.00 |
| Cast iron borings | 10.50 to 11.00 |
| Mixed bor. & turn. | 9.50 to 10.00 |
| Low phos. plate | 20.50 to 21.50 |
| No. 1 cupola cast | 20.00* |
| Hvy. breakable cast | 16.50* |
| Stove plate | 16.00 to 16.50 |
| Scrap rails | 20.00 to 21.00 |

## BOSTON

**Dealers' buying prices per gross ton, f.o.b. cars**

| | |
|---|---|
| No. 1 hvy. melting | $15.05* |
| No. 2 hvy. melting | 15.05* |
| No. 1 and 2 bundles | 15.05* |
| Busheling | 15.05* |
| Turnings, shovelings | 12.05* |
| Machine shop turn. | 10.05* |
| Mixed bor. & turn. | 10.05* |
| Cl'n cast, chem. bor. | $13.06 to 14.15* |
| *Truck delivery to foundry* | |
| Machinery cast | 21.00 to 23.51* |
| Breakable cast | 21.57 to 21.87* |
| Stove plate | 20.00 to 23.51* |

## DETROIT

**Per gross ton, brokers' buying prices:**

| | |
|---|---|
| No. 1 hvy. melting | $17.32* |
| No. 2 hvy. melting | 17.32* |
| No. 1 bundles | 17.32* |
| New busheling | 17.32* |
| Flashings | 17.32* |
| Mach. shop turn. | $8.50 to 9.00 |
| Short shov. turn. | 11.00 to 11.50 |
| Cast iron borings | 10.00 to 10.50 |
| Mixed bor. & turn. | 9.00 to 9.50 |
| Low phos. plate | 18.50 to 19.82 |
| No. 1 cupola cast | 20.00* |
| Charging box cast | 18.00 to 19.00 |
| Hvy. breakable cast | 15.50 to 16.50 |
| Stove plate | 18.50 to 19.00 |
| Automotive cast | 20.00* |

## PHILADELPHIA

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $18.75* |
| No. 2 hvy melting | 18.75* |
| No. 2 bundles | 18.75* |
| Mach. shop turn. | 13.75* |
| Shoveling turn. | 15.75* |
| Cast iron borings | 14.75* |
| Mixed bor. & turn. | 13.75* |
| No. 1 cupola cast | 20.00* |
| Hvy. breakable cast | 16.50* |
| Cast, charging box | 19.00* |
| Hvy. axle, forge turn | 18.25* |
| Low phos. plate | 21.25* |
| Low phos. punchings | 21.25* |
| Billet crops | 21.25* |
| RR. steel wheels | 23.25* |
| RR. coil springs | 23.25* |
| RR. malleable | 22.00* |

## ST. LOUIS

**Per gross ton delivered to consumer:**

| | |
|---|---|
| Heavy melting | $17.50* |
| Bundled sheets | 17.50* |
| Mach. shop turn. | $10.00 to 10.50 |
| Hvy. axle turn. | 16.75 |
| No. 1 locomo. tires | 20.00 |
| Misc. std. sec. rails | 19.00* |
| Rerolling rails | 21.00* |
| Steel angle bars | 21.00* |
| Rails 3 ft. and under | 21.50* |
| RR. springs | 22.00* |
| Steel car axles | 21.50 to 22.00 |
| Stove plate | 17.00 |
| Grate bars | 15.25* |
| Brake shoes | 15.25* |
| RR. malleable | 22.00* |
| Cast iron carwheels | 18.50* |
| No. 1 mach'ery cast | 20.00* |
| Breakable cast | 16.50* |

## BIRMINGHAM

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $17.00* |
| No. 2 hvy. melting | 17.00* |
| No. 2 bundles | 17.00* |
| No. 1 busheling | 17.00* |
| Long turnings | $9.50 to 10.00 |
| Cast iron borings | 9.50 to 10.00 |
| Bar crops and plate | 19.50* |
| Structural and plate | 19.50* |
| No. 1 cast | 20.00* |
| Stove plate | 17.00 |
| Steel axles | 18.00* |
| Scrap rails | 18.50 |
| Rerolling rails | 20.50* |
| Angles & splice bars | 20.50* |
| Rails 3 ft. & under | 21.00* |
| Cast iron carwheels | 16.50 to 17.00 |

## YOUNGSTOWN

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $20.00* |
| No. 2 hvy. melting | 20.00* |
| Low phos. plate | 22.50* |
| No. 1 busheling | 20.00* |
| Hydraulic bundles | 20.00* |
| Mach. shop turn. | $13.50 to 14.00 |
| Short shovel. turn. | 16.00 to 16.50 |
| Cast iron borings | 15.00 to 15.50 |

## NEW YORK

**Dealers' buying prices, per gross ton, on cars**

| | |
|---|---|
| No. 1 hvy. melting | $15.33* |
| No. 2 hvy. melting | 15.33* |
| Comp. black bundles | 15.33* |
| Comp. galv. bundles | 13.33* |
| Mach. shop turn. | 10.33* |
| Mixed bor. & turn. | 10.33* |
| No. 1 cupola cast | 20.00* |
| Hvy. breakable cast | 16.50* |
| Charging box cast | 19.00* |
| Stove plate | 19.00* |
| Clean auto cast | 20.00* |
| Unstrip. motor blks. | 17.50* |
| Cl'n chem. cast bor. | 14.33* |

## BUFFALO

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $19.25* |
| No. 1 bundles | 19.25* |
| No. 2 bundles | 19.25* |
| No. 2 hvy. melting | 19.25* |
| Mach. shop turn. | $13.50 to 14.00 |
| Shoveling turn. | 16.25* |
| Cast iron borings | 15.25* |
| Mixed bor. & turn. | 14.25* |
| No. 1 cupola cast | 20.00* |
| Stove plate | 19.00* |
| Low phos. plate | 21.75* |
| Scrap rails | 20.75* |
| Rails 3 ft. & under | 22.75* |
| RR. steel wheels | 23.75* |
| Cast iron car wheels | 20.00* |
| RR. coil & leaf spgs. | 23.75* |
| RR. knuckles & coup. | 23.75* |
| RR. malleable | 22.00* |
| No. 1 busheling | 19.25* |

## CLEVELAND

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $19.50* |
| No. 2 hvy. melting | 19.50* |
| Compressed sheet stl. | 19.50* |
| Drop forge flashings | 19.00* |
| No. 2 bundles | 19.50* |
| Mach. shop turn. | $13.50 to 14.00 |
| Short shovel. | 16.50* |
| No. 1 busheling | 19.50* |
| Steel axle turn. | 18.00* |
| Low phos. billet and bloom crops | 23.66* |
| Cast iron borings | 15.50* |
| Mixed bor. & turn. | 14.50* |
| No. 2 busheling | 17.00* |
| No. 1 machine cast | 20.00* |
| Railroad cast | 20.00* |
| Railroad grate bars | 15.25* |
| Stove plate | 19.00* |
| RR. hvy. melting | 20.50* |
| Rails 3 ft. & under | 23.00* |
| Rails 18 in. & under | 24.25* |
| Rails for rerolling | 23.00* |
| Railroad malleable | 22.00* |
| Elec. furnace punch. | 22.00* |

## SAN FRANCISCO

**Per gross ton delivered to consumer:**

| | |
|---|---|
| RR. hvy. melting | $15.50 to $16.25 |
| No. 1 hvy. melting | 15.50 to 16.25 |
| No. 2 hvy. melting | 14.50 to 15.25 |
| No. 2 bales | 13.50 to 14.25 |
| No. 3 bales | 9.50 to 10.59 |
| Mach. shop turn. | 7.00 |
| Elec. furn. 1 ft., und. | 15.50 to 17.00 |
| No. 1 cupola cast | 19.00 to 21.00 |

## LOS ANGELES

**Per gross ton delivered to consumer:**

| | |
|---|---|
| No. 1 hvy. melting | $14.00 to $15.00 |
| No. 2 hvy. melting | 13.00 to 14.00 |
| No. 2 bales | 12.00 to 13.00 |
| No. 3 bales | 9.00 to 10.00 |
| Mach. shop turn. | 4.50 |
| No. 1 cupola cast | 19.00 to 21.00 |

## SEATTLE

**Per gross ton delivered to consumer:**

| | |
|---|---|
| RR. hvy. melting | $13.50 |
| No. 1 hvy. melting | 13.50 |
| No. 3 bundles | 11.50 |
| Elec. furn. 1 ft., und. | $16.00 to 17.00 |
| No. 1 cupola cast | 20.00* |

# Comparison of Prices . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. Prices are F.O.B. Major Basing Points. The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 147-155.

| Flat Rolled Steel: (Cents Per Lb.) | Feb. 6, 1945 | Jan. 30, 1945 | Jan. 2, 1945 | Feb. 8, 1944 |
|---|---|---|---|---|
| Hot rolled sheets* | 2.10 | 2.10 | 2.10 | 2.10 |
| Cold rolled sheets | 3.05 | 3.05 | 3.05 | 3.05 |
| Galvanized sheets (24 ga.)* | 3.50 | 3.50 | 3.50 | 3.50 |
| Hot rolled strip | 2.10 | 2.10 | 2.10 | 2.10 |
| Cold rolled strip | 2.80 | 2.80 | 2.80 | 2.80 |
| Plates* | 2.10 | 2.10 | 2.10 | 2.10 |
| Plates, wrought iron | 3.80 | 3.80 | 3.80 | 3.80 |
| Stain's c.r. strip (No. 302) | 28.00 | 28.00 | 28.00 | 28.00 |
| **Tin and Terne Plate:** (Dollars Per Base Box) | | | | |
| Tin plate, standard cokes | $5.00 | $5.00 | $5.00 | $5.00 |
| Tin plate, electrolytic | 4.50 | 4.50 | 4.50 | 4.50 |
| Special coated mfg. ternes | 4.30 | 4.30 | 4.30 | 4.30 |
| **Bars and Shapes:** (Cents Per Lb.) | | | | |
| Merchant bars | 2.15 | 2.15 | 2.15 | 2.15 |
| Cold finished bars | 2.65 | 2.65 | 2.65 | 2.65 |
| Alloy bars | 2.70 | 2.70 | 2.70 | 2.70 |
| Structural shapes | 2.10 | 2.10 | 2.10 | 2.10 |
| Stainless bars (No. 302) | 24.00 | 24.00 | 24.00 | 24.00 |
| Wrought iron bars | 4.40 | 4.40 | 4.40 | 4.40 |
| **Wire and Wire Products:** (Cents Per Lb.) | | | | |
| Plain wire | 2.60 | 2.60 | 2.60 | 2.60 |
| Wire nails* | 2.55 | 2.55 | 2.55 | 2.55 |
| **Rails:** (Dollars Per Gross Ton) | | | | |
| Heavy rails* | $40.00 | $40.00 | $40.00 | $40.00 |
| Light rails* | 40.00 | 40.00 | 40.00 | 40.00 |
| **Semi-Finished Steel:** (Dollars Per Gross Ton) | | | | |
| Rerolling billets | $34.00 | $34.00 | $34.00 | $34.00 |
| Sheet bars | 34.00 | 34.00 | 34.00 | 34.00 |
| Slabs, rerolling | 34.00 | 34.00 | 34.00 | 34.00 |
| Forging billets | 40.00 | 40.00 | 40.00 | 40.00 |
| Alloy blooms, billets, slabs | 54.00 | 54.00 | 54.00 | 54.00 |
| **Wire Rods and Skelp:** (Cents Per Lb.) | | | | |
| Wire rods | 2.00 | 2.00 | 2.00 | 2.00 |
| Skelp | 1.90 | 1.90 | 1.90 | 1.90 |

| Pig Iron: (Per Gross Ton) | Feb. 6, 1945 | Jan. 30, 1945 | Jan. 2, 1945 | Feb. 8, 1944 |
|---|---|---|---|---|
| No. 2 fdy., Philadelphia | $25.84 | $25.84 | $25.84 | $25.84 |
| No. 2, Valley furnace | 24.00 | 24.00 | 24.00 | 24.00 |
| No. 2, Southern Cin'ti | 25.11 | 25.11 | 25.11 | 23.94 |
| No. 2, Birmingham | 20.38 | 20.38 | 20.38 | 20.38 |
| No. 2, foundry, Chicago† | 24.00 | 24.00 | 24.00 | 24.00 |
| Basic, del'd eastern Pa. | 25.34 | 25.34 | 25.34 | 25.34 |
| Basic, Valley furnace | 23.50 | 23.50 | 23.50 | 23.50 |
| Malleable, Chicago† | 24.00 | 24.00 | 24.00 | 24.00 |
| Malleable, Valley | 24.00 | 24.00 | 24.00 | 24.00 |
| L. S. charcoal, Chicago | 37.34 | 37.34 | 37.34 | 37.34 |
| Ferromanganese‡ | 135.00 | 135.00 | 135.00 | 135.00 |

† The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡ For carlots at seaboard.

| Scrap: (Per Gross Ton) | | | | |
|---|---|---|---|---|
| Heavy melt'g steel, P'gh. | $20.00 | $20.00 | $20.00 | $20.00 |
| Heavy melt'g steel, Phila. | 18.75 | 18.75 | 18.75 | 18.75 |
| Heavy melt'g steel, Ch'go | 18.75 | 18.75 | 18.75 | 18.75 |
| No. 1 hy. comp. sheet, Det. | 17.32 | 17.32 | 17.32 | 17.85 |
| Low phos. plate, Youngs'n | 22.50 | 22.50 | 22.25 | 22.50 |
| No. 1 cast, Pittsburgh | 20.00* | 20.00* | 20.00* | 20.00 |
| No. 1 cast, Philadelphia | 20.00* | 20.00* | 20.00* | 20.00 |
| No. 1 cast, Chicago | 20.00* | 20.00* | 20.00* | 20.00 |

*F.O.B. shipping point.

| Coke, Connellsville: (Per Net Ton at Oven) | | | | |
|---|---|---|---|---|
| Furnace coke, prompt | $7.00 | $7.00 | $7.00 | $7.00 |
| Foundry coke, prompt | 8.25 | 8.25 | 8.25 | 8.25 |

| Non-Ferrous Metals: (Cents Per Lb. to Large Buyers) | | | | |
|---|---|---|---|---|
| Copper, electro., Conn. | 12.00 | 12.00 | 12.00 | 12.00 |
| Copper, Lake | 12.00 | 12.00 | 12.00 | 12.00 |
| Tin (Straits), New York | 52.00 | 52.00 | 52.00 | 52.00 |
| Zinc, East St. Louis | 8.25 | 8.25 | 8.25 | 8.25 |
| Lead, St. Louis | 6.35 | 6.35 | 6.35 | 6.35 |
| Aluminum, Virgin, del'd. | 15.00 | 15.00 | 15.00 | 15.00 |
| Nickel, electrolytic | 35.00 | 35.00 | 35.00 | 35.00 |
| Magnesium, ingot | 20.50 | 20.50 | 20.50 | 20.50 |
| Antimony, Laredo, Tex. | 14.50 | 14.50 | 14.50 | 14.50 |

* For interim increase on delivered price granted by OPA as of Jan. 11, 1945, see detailed price tables.

# Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

| | FINISHED STEEL | PIG IRON | SCRAP STEEL |
|---|---|---|---|
| February 6, 1945 | 2.33408c. a Lb. | $23.61 a Gross Ton | $19.17 a Gross Ton |
| One week ago | 2.33408c. a Lb. | $23.61 a Gross Ton | $19.17 a Gross Ton |
| One month ago | 2.30837c. a Lb. | $23.61 a Gross Ton | $19.17 a Gross Ton |
| One year ago | 2.25513c. a Lb. | $23.61 a Gross Ton | $19.17 a Gross Ton |

| | FINISHED STEEL HIGH | FINISHED STEEL LOW | PIG IRON HIGH | PIG IRON LOW | SCRAP STEEL HIGH | SCRAP STEEL LOW |
|---|---|---|---|---|---|---|
| 1944 | 2.30837c. Sept. 5 | 2.272349c., Jan. 4 | $23.61 | $23.61 | $19.17 | $15.67, Oct. 24 |
| 1943 | 2.25513c. | 2.25513c. | 23.61 | 23.61 | 19.17 | 19.17 |
| 1942 | 2.26190c. | 2.26190c. | 23.61 | 23.61 | 19.17 | 19.17 |
| 1941 | 2.43078c. | 2.43078c. | $23.61, Mar. 20 | $23.45, Jan. 2 | $22.00, Jan. 7 | $19.17, Apr. 10 |
| 1940 | 2.30467c., Jan. 2 | 2.24107c., Apr. 16 | 23.45, Dec. 23 | 22.61, Jan. 2 | 21.83, Dec. 30 | 16.04, Apr. 9 |
| 1939 | 2.35367c., Jan. 3 | 2.26689c., May 16 | 22.61, Sept. 19 | 20.61, Sept. 12 | 22.50, Oct. 3 | 14.08, May 16 |
| 1938 | 2.58414c., Jan. 4 | 2.27207c., Oct. 18 | 23.25, June 21 | 19.61, July 6 | 15.00, Nov. 22 | 11.00, June 7 |
| 1937 | 2.58414c., Mar. 9 | 2.32263c., Jan. 4 | 23.25, Mar. 9 | 20.25, Feb. 16 | 21.92, Mar. 30 | 12.67, June 8 |
| 1936 | 2.32263c., Dec. 28 | 2.05200c., Mar. 10 | 19.74, Nov. 24 | 18.73, Aug. 11 | 17.75, Dec. 21 | 12.67, June 9 |
| 1935 | 2.07642c., Oct. 1 | 2.06492c., Jan. 8 | 18.84, Nov. 5 | 17.83, May 14 | 13.42, Dec. 10 | 10.33, Apr. 29 |
| 1934 | 2.15367c., Apr. 24 | 1.95757c., Jan. 2 | 17.90, May 1 | 16.90, Jan. 27 | 13.00, Mar. 13 | 9.50, Sept. 25 |
| 1933 | 1.95578c., Oct. 3 | 1.75836c., May 2 | 16.90, Dec. 5 | 13.56, Jan. 3 | 12.25, Aug. 8 | 6.75, Jan. 3 |
| 1932 | 1.89196c., July 5 | 1.83901c. Mar. 1 | 14.81, Jan. 5 | 13.56, Dec. 6 | 8.50, Jan. 12 | 6.43, July 5 |
| 1931 | 1.99626c., Jan. 13 | 1.86586c., Dec. 29 | 15.90, Jan. 6 | 14.79, Dec. 15 | 11.33, Jan. 6 | 8.50, Dec. 29 |
| 1930 | 2.25488c., Jan. 7 | 1.97319c., Dec. 9 | 18.21, Jan. 7 | 15.90, Dec. 16 | 15.00, Feb. 18 | 11.25, Dec. 9 |
| 1929 | 2.31773c., May 28 | 2.26498c., Oct. 29 | 18.71, May 14 | 18.21, Dec. 17 | 17.58, Jan. 29 | 14.08, Dec. 3 |

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

# Prices of Finished Iron and Steel. . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 0.10c. per lb. under base; primes 0.25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price for annealed, bright finish wires, commercial spring wire. (15) Add 10c. per 100 lb. to delivered price—OPA interim increase, Jan. 11, 1945. (16) Add 15c. per 100 lb. to delivered price—OPA interim increase, Jan. 11, 1945. (17) Add 10c. per 100 lb. to delivered price of plates produced to sheared mill or universal mill width and length tolerances—OPA interim increase, Jan. 11, 1945.

| Basing Point → / Product ↓ | Pittsburgh | Chicago | Gary | Cleveland | Birmingham | Buffalo | Youngstown | Sparrows Point | Granite City | Middletown, Ohio | Gulf Ports, Cars | Pacific Ports, Cars[12] | DELIVERED TO Detroit | New York | Philadelphia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hot Rolled Sheets[14] | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.20¢ | 2.10¢ | | 2.65¢ | 2.20¢ | 2.34¢ | 2.27¢ |
| Cold Rolled Sheets[1] | 3.05¢ | 3.05¢ | 3.05¢ | 3.05¢ | | 3.05¢ | 3.05¢ | | 3.15¢ | 3.05¢ | | 3.70¢ | 3.15¢ | 3.39¢ | 3.37¢ |
| Galvanized Sheets (24 gage)[14] | 3.50¢ | 3.50¢ | 3.50¢ | | 3.50¢ | 3.50¢ | 3.50¢ | 3.50¢ | 3.60¢ | 3.50¢ | | 4.05¢ | | 3.74¢ | 3.67¢ |
| Enameling Sheets (20 gage) | 3.35¢ | 3.35¢ | 3.35¢ | 3.35¢ | | | 3.35¢ | | 3.45¢ | 3.35¢ | | 4.00¢ | 3.45¢ | 3.71¢ | 3.67¢ |
| Long Ternes[2] | 3.80¢ | 3.80¢ | 3.80¢ | | | | | | | | | 4.55¢ | | 4.16¢ | 4.12¢ |
| Hot Rolled Strip[3] | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | | | 2.10¢ | | 2.75¢ | 2.20¢ | 2.40¢ | |
| Cold Rolled Strip[4] | 2.80¢ | 2.90¢ | | 2.80¢ | | | 2.80¢ | (Worcester=3.00¢) | | | | | 2.90¢ | 3.16¢ | |
| Cooperage Stock Strip | 2.20¢ | 2.20¢ | | | 2.20¢ | | 2.20¢ | | | | | | | 2.56¢ | |
| Commodity C-R Strip | 2.95¢ | 3.05¢ | | 2.95¢ | | | 2.95¢ | (Worcester=3.35¢) | | | | | 3.05¢ | 3.31¢ | |
| Coke Tin Plate, Base Box | $5.00 | $5.00 | $5.00 | | | | | | $5.10 | | | | | 5.36¢ | 5.32¢ |
| .25 / .50 / .75 Electro Tin Plate, Box | $4.35 / $4.50 / $4.65 | $4.35 / $4.50 | $4.35 / $4.50 / $4.65 | | | | | | $4.60 / $4.75 | | | | | | |
| Black Plate (29 gage)[5] | 3.05¢ | 3.05¢ | 3.05¢ | | | | | | 3.15¢ | | | 4.05¢[12] | | | 3.37¢ |
| Mfg. Ternes, Special Box | $4.30 | $4.30 | $4.30 | | | | | | $4.40 | | | | | | |
| Carbon Steel Bars | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | (Duluth=2.25¢) | | | 2.50¢ | 2.80¢ | 2.25¢ | 2.49¢ | 2.47¢ |
| Rail Steel Bars[6] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | | | 2.50¢ | 2.80¢ | | | |
| Reinforcing (Billet) Bars[7] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | 2.50¢ | 2.55¢[13] | 2.25¢ | 2.39¢ | |
| Reinforcing (Rail) Bars[7] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | | 2.50¢ | c2.55¢[13] | 2.25¢ | | 2.47¢ |
| Cold Finished Bars[8] | 2.65¢ | 2.65¢ | 2.65¢ | 2.65¢ | | 2.65¢ | | (Detroit=2.70¢) | | | (Toledo=2.80¢) | | | 2.99¢ | 2.97¢ |
| Alloy Bars, Hot Rolled | 2.70¢ | 2.70¢ | | | | 2.70¢ | (Bethlehem, Massillon, Canton=2.70¢) | | | | | | 2.80¢ | | |
| Alloy Bars, Cold Drawn | 3.35¢ | 3.35¢ | 3.35¢ | 3.35¢ | | 3.35¢ | | | | | | | 2.45¢ | | |
| Carbon Steel Plates[17] | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | (Coatesville and Claymont=2.10¢) 2.10¢ | 2.35¢ | | 2.45¢ | 2.65¢ | 2.32¢ | 2.29¢ | 2.15¢ |
| Floor Plates | 3.35¢ | 3.35¢ | | | | | | | | | 3.70¢ | 4.00¢ | | 3.71¢ | 3.67¢ |
| Alloy Plates | 3.50¢ | 3.50¢ | | | (Coatesville=3.50¢) | | | | | | 3.95¢ | 4.15¢ | | 3.70¢ | 3.59¢ |
| Structural Shapes | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | 2.10¢ | (Bethlehem=2.10¢) | | | | 2.45¢ | 2.75¢ | | 2.27¢ | 2.215¢ |
| SPRING STEEL, C-R | | | | | | | | | | | | | | | |
| 0.26 to 0.50 Carbon | 2.80¢ | | | 2.80¢ | | | (Worcester=3.00¢) | | | | | | | | |
| 0.51 to 0.75 Carbon | 4.30¢ | | | 4.30¢ | | | (Worcester=4.50¢) | | | | | | | | |
| 0.76 to 1.00 Carbon | 6.15¢ | | | 6.15¢ | | | (Worcester=6.35¢) | | | | | | | | |
| 1.01 to 1.25 Carbon | 8.35¢ | | | 8.35¢ | | | (Worcester=8.55¢) | | | | | | | | |
| Bright Wire[14] | 2.60¢ | 2.60¢ | | 2.60¢ | 2.60¢ | | (Worcester=2.70¢) | | (Duluth=2.65¢) | | | 3.10¢ | | | 2.92¢ |
| Galvanized Wire | Add proper size extra and galvanizing extra to Bright Wire base. | | | | | | | | | | | | | | |
| Spring (High Carbon) | 3.20¢ | 3.20¢ | | 3.20¢ | | | (Worcester=3.30¢) | | | | | 3.70¢ | | | 3.52¢ |
| Steel Sheet Piling | 2.40¢ | 2.40¢ | | | | 2.40¢ | | | | | | 2.95¢ | | | 2.72¢ |

**EXCEPTIONS TO PRICE SCHED. NO. 6**

**Slabs**—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50.

**Blooms**—Phoenix Iron Co. (rerolling) $41, (forging) $47; Pgh. Steel Co. (reroll) $38.25, (forging) $44.25. Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth.

**Sheet bar**—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

**Billets, Forging**—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill. Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50.

**Billets, Rerolling**—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2 $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich. Geneva Steel Co. $58.64 f.o.b. Pac. C. Pgt. Steel Co. $43.50.

**Structural Shapes**—Phoenix Iron Co. $2.35 basing pts. (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing points.

**Rails**—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

**Hot Rolled Plate**—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. and Geneva Steel Co. $3.20 Pacific Ports; Central Iron and Steel Co. $2.50 basing points; Granite City Steel Co. $2.35 Granite City.

**Merchant Bars**—W. Ames Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. &Supply Co., $2.35 Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill. Milton Mfg. Co. $2.75 f.o.b. Milton, Pa.

**Pipe Skelp**—Wheeling Steel Corp., Benwood, $2.05 per cwt.

**Reinforcing Bars**—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

**Cold Finished Bars**—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

**Alloy Bars**—Texas Steel Co. for delivery except Texas and Okla. Chicago, base, f.o.b. Fort Worth, Tex.; Conors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

**Hot Rolled Strip**—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

**Hot Rolled Sheets**—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

**Galvanized Sheets**—Andrews Steel Co. $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

**Pipe and Tubing**—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

**Black Sheets**—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

## WAREHOUSE PRICES

*Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.*

| Cities | SHEETS | | | STRIP | | Plates ¼ in. and heavier | Structural Shapes | BARS | | ALLOY BARS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hot Rolled (10 gage) | Cold Rolled | Galvanized (24 gage) | Hot Rolled | Cold Rolled | | | Hot Rolled | Cold Finished | Hot Rolled, NE 8617-20 | Hot Rolled, NE 9442-45 Ann. | Cold Drawn, NE 8617-20 | Cold Drawn, NE 9442-48 Ann. |
| **Philadelphia | 3.518 | 4.872[8] | 5.018a | 3.922 | 4.772 | 3.605 | 3.666 | 3.822 | 4.072 | 5.966 | 7.066 | 7.272 | 8.322 |
| New York | 3.590 | 4.613[3] | 5.010 | 3.974[6] | 4.772 | 3.768 | 3.758 | 3.853 | 4.103 | 6.008 | 7.108 | 7.303 | 8.353 |
| Boston | 3.744 | 4.744[9] | 5.224[9] | 4.106 | 4.715 | 3.912 | 3.912 | 4.044 | 4.144 | 6.162 | 7.262 | 7.344 | 8.394 |
| Baltimore | 3.394 | 4.852 | 4.894 | 3.902 | 4.752 | 3.594 | 3.759 | 3.802 | 4.052 | .. | .... | .... | .... |
| Norfolk | 3.771 | 4.965 | 5.371 | 4.165 | 4.865 | 3.971 | 4.002 | 4.065 | 4.165 | .. | .... | .... | .... |
| Chicago | 3.26 | 4.20 | 5.231 | 3.60 | 4.65[17] | 3.55 | 3.55 | 3.50 | 3.75 | 5.75 | 6.85 | 6.85 | 7.90 |
| Milwaukee | 3.387 | 4.337[3] | 5.272[4] | 3.737 | 4.787[17] | 3.687 | 3.687 | 3.637 | 3.887 | 5.987 | 7.087 | 7.087 | 8.137 |
| Cleveland | 3.35 | 4.40 | 4.877[4] | 3.60 | 4.45 | 3.40 | 3.588 | 3.35 | 3.75 | 5.956 | 7.056 | 6.85 | 7.90 |
| Buffalo | 3.35 | 4.40 | 4.75[4] | 3.819 | 4.669 | 3.63 | 3.40 | 3.35 | 3.75 | 5.75 | 6.85 | 6.85 | 7.90 |
| Detroit | 3.45 | 4.50 | 5.00[4] | 3.70 | 4.659[17] | 3.609 | 3.661 | 3.45 | 3.80 | 6.08 | 7.18 | 7.159 | 8.209 |
| Cincinnati | 3.425 | 4.475[3] | 4.825[5] | 3.675 | 4.711 | 3.611 | 3.691 | 3.611 | 4.011 | .... | .... | .... | .... |
| St. Louis | 3.397 | 4.347[3] | 5.172[4] | 3.747 | 4.931[17] | 3.697 | 3.697 | 3.647 | 4.031 | 6.131 | 7.231 | 7.231 | 8.281 |
| Pittsburgh | 3.35 | 4.40 | 4.75 | 3.60 | 4.45 | 3.40 | 3.40 | 3.35 | 3.75 | 5.75 | 6.85 | 6.85 | 7.90 |
| St. Paul | 3.51 | 4.48 | 5.257[4] | 3.86 | 4.35[17] | 3.811[3] | 3.811[3] | 3.761[3] | 4.361 | 6.09 | 7.19 | 7.561 | 8.711 |
| Omaha | 3.865 | 5.443 | 5.608[4] | 4.215 | .... | 4.165 | 4.165 | 4.115 | 4.43 | .. | .... | .... | .... |
| Indianapolis | 3.58 | 3.58 | 4.568 | 4.918 | 3.768 | 4.78 | 3.03 | 3.58 | 3.96 | 8.08 | 7.18 | 7.18 | 8.23 |
| Birmingham | 3.45 | .... | 4.75 | 3.70 | .... | 3.55 | 3.55 | 3.50 | 4.43 | .... | .... | .... | .... |
| Memphis | 3.965[7] | 4.66 | 3.265 | 4.215 | .... | 4.065 | 4.065 | 4.015 | 4.33 | .. | .... | .... | .... |
| New Orleans | 4.058* | 4.95 | 5.358 | 4.308 | .... | 4.158 | 4.158* | 4.108* | 4.629 | .... | .... | .... | .... |
| Houston | 3.763 | 5.573 | 6.313[1] | 4.313 | .... | 4.25 | 4.25 | 3.75 | 6.373[3] | 7.223 | 8.323 | 8.323 | 9.373 |
| Los Angeles | 5.00 | 7.20[3] | 6.10[4] | 4.95 | 5.613[15] | 4.95 | 4.85 | 4.40 | 5.583 | 8.304 | 9.404 | 9.404 | 10.454 |
| San Francisco | 4.55[14] | 7.30[4] | 6.35[4] | 4.50[14] | 7.333[17] | 4.65[14] | 4.35[14] | 4.15[14] | 5.333 | 8.304 | 9.404 | 9.404 | 10.454 |
| Seattle | 4.65[12] | 7.05[4] | 5.95[4] | 4.25[12] | .... | 4.75[12] | 4.45[12] | 4.35[12] | 5.783 | .. | 9.404 | .... | .... |
| Portland | 4.65[11] | 6.60[4] | 5.75[4] | 4.75[11] | .... | 4.75[11] | 4.45[11] | 4.45[11] | 5.533 | 8.304 | 9.404 | 8.304 | 9.404 |
| Salt Lake City | 4.53[17] | .... | 6.17[18] | 5.53[17] | .... | 4.98[17] | 4.98[17] | 4.88[17] | 5.90 | .. | .... | .... | .... |

## National Emergency Steels

### MILL EXTRAS

| Designation | Basic Open-Hearth | | Electric Furnace | | Designation | Basic Open-Hearth | | Electric Furnace | |
|---|---|---|---|---|---|---|---|---|---|
| | Bars and Bar-Strip | Billets, Blooms, and Slabs | Bars and Bar-Strip | Billets, Blooms, and Slabs | | Bars and Bar-Strip | Billets, Blooms, and Slabs | Bars and Bar-Strip | Billets, Blooms, and Slabs |
| NE 8612 | 0.65¢ | $13.00 | $1.15 | $23.00 | NE 9427 | 0.75 | 15.00 | 1.25 | 25.00 |
| NE 8615 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9430 | 0.75 | 15.00 | 1.25 | 25.00 |
| NE 8617 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9432 | 0.75 | 15.00 | 1.25 | 25.00 |
| NE 8620 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9435 | 0.75 | 15.00 | 1.25 | 25.00 |
| NE 8622 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9437 | 0.75 | 15.00 | 1.25 | 25.00 |
| NE 8625 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9440 | 0.75 | 15.00 | 1.25 | 25.00 |
| NE 8627 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9442 | 0.80 | 16.00 | 1.30 | 26.00 |
| NE 8630 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9445 | 0.80 | 16.00 | 1.30 | 26.00 |
| NE 8632 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9447 | 0.80 | 16.00 | 1.30 | 26.00 |
| NE 8635 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9450 | 0.80 | 16.00 | 1.30 | 26.00 |
| NE 8637 | 0.65 | 13.00 | 1.15 | 23.00 | | | | | |
| NE 8640 | 0.65 | 13.00 | 1.15 | 23.00 | | | | | |
| NE 8642 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9722 | 0.65¢ | $13.00 | $1.15 | $23.00 |
| NE 8645 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9727 | 0.65 | 13.00 | 1.15 | 23.00 |
| NE 8647 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9732 | 0.65 | 13.00 | 1.15 | 23.00 |
| NE 8650 | 0.65 | 13.00 | 1.15 | 23.00 | NE 9737 | 0.65 | 13.00 | 1.15 | 23.00 |
| | | | | | NE 9742 | 0.65 | 13.00 | 1.15 | 23.00 |
| | | | | | NE 9745 | 0.65 | 13.00 | 1.15 | 23.00 |
| NE 8712 | 0.70¢ | $14.00 | $1.20 | $24.00 | NE 9747 | 0.65 | 13.00 | 1.15 | 23.00 |
| NE 8715 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9750 | 0.65 | 13.00 | 1.15 | 23.00 |
| NE 8717 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9763 | 0.65 | 13.00 | 1.15 | 23.00 |
| NE 8720 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9768 | 0.65 | 13.00 | 1.15 | 23.00 |
| NE 8722 | 0.70 | 14.00 | 1.20 | 24.00 | | | | | |
| NE 8725 | 0.70 | 14.00 | 1.20 | 24.00 | | | | | |
| NE 8727 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9830 | $1.30 | $26.00 | $1.80 | $36.00 |
| NE 8730 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9832 | 1.30 | 26.00 | 1.80 | 36.00 |
| NE 8732 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9835 | 1.30 | 26.00 | 1.80 | 36.00 |
| NE 8735 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9837 | 1.30 | 26.00 | 1.80 | 36.00 |
| NE 8737 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9840 | 1.30 | 26.00 | 1.80 | 36.00 |
| NE 8740 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9842 | 1.30 | 26.00 | 1.80 | 36.00 |
| NE 8742 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9845 | 1.30 | 26.00 | 1.80 | 36.00 |
| NE 8745 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9847 | 1.30 | 26.00 | 1.80 | 36.00 |
| NE 8747 | 0.70 | 14.00 | 1.20 | 24.00 | NE 9850 | 1.30 | 26.00 | 1.80 | 36.00 |
| NE 8750 | 0.70 | 14.00 | 1.20 | 24.00 | | | | | |
| | | | | | NE 9912 | $1.20 | $24.00 | $1.55 | $31.00 |
| NE 9415 | 0.75¢ | $15.00 | $1.25 | $25.00 | NE 9915 | 1.20 | 24.00 | 1.55 | 31.00 |
| NE 9417 | 0.75 | 15.00 | 1.25 | 25.00 | NE 9917 | 1.20 | 24.00 | 1.55 | 31.00 |
| NE 9420 | 0.75 | 15.00 | 1.25 | 25.00 | NE 9920 | 1.20 | 24.00 | 1.55 | 31.00 |
| NE 9422 | 0.75 | 15.00 | 1.25 | 25.00 | NE 9922 | 1.20 | 24.00 | 1.55 | 31.00 |
| NE 9425 | 0.75 | 15.00 | 1.25 | 25.00 | NE 9925 | 1.20 | 24.00 | 1.55 | 31.00 |

**Note 1:** The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. **Note 2:** For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, A.I.S.I. Steel Products Manual. **Note 3:** When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. **Note 4:** The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

## BASE QUANTITIES

*Standard unless otherwise keyed on prices.*

**HOT ROLLED:** Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

**COLD ROLLED:** Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

**EXCEPTIONS:** (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(*) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

## LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

| | *Per Gross Ton* |
|---|---|
| Old range, bessemer, 51.50 | $4.75 |
| Old range, non-bessemer, 51.50 | 4.60 |
| Mesaba, bessemer, 51.50 | 4.60 |
| Mesaba, non-bessemer, 51.50 | 4.45 |
| High phosphorus, 51.50 | 4.35 |

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

## FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

### *Exception*

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

| Effective $CaF_2$ Content: | *Base price per short ton* |
|---|---|
| 70% or more | $33.00 |
| 65% but less than 70% | 32.00 |
| 60% but less than 65% | 31.00 |
| Less than 60% | 30.00 |

## PRICES

### SEMI-FINISHED STEEL

***Ingots, Carbon, Rerolling***

Base per gross ton, f.o.b. mill.... $31.00
*Exceptions:* Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10.

***Ingots, Carbon, Forging***

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown ..... $36.00
*Exceptions:* Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

***Ingots, Alloy***

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh ..... $45.00
*Exceptions:* C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co may charge $45.00 f.o.b. Birmingham.

***Billets, Blooms and Slabs***

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

*Per Gross Ton*

Rerolling ..... $34.00
Forging quality ..... 40.00
For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

***Alloy Billets, Blooms, Slabs***

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton ..... $54.00
Price delivered Detroit $2.00 higher; E. Michigan, $3.00 higher.

***Shell Steel***

*Per Gross Ton*

8 in. to 12 in. ..... $52.00
13 in. to 18 in. ..... 54.00
18 in. and over ..... 56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Price Exception: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

***Sheet Bars***

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

*Per Gross Ton*

Open hearth or bessemer ..... $34.00

***Skelp***

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

*Per Lb.*

Grooved, universal and sheared .. 1.90c.

***Wire Rods***

*(No. 5 to 9/32 in.)*

*Per Lb.*

Pittsburgh, Chicago, Cleveland ... 2.00c.
Worcester, Mass. ..... 2.10c.
Birmingham ..... 2.00c.
San Francisco ..... 2.50c.
Galveston ..... 2.25c.
9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

### TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse)*

*Base per lb.*

High speed ..... 67c.
Straight molybdenum ..... 54c.
Tungsten-molybdenum ..... 57½c.
High-carbon-chromium ..... 43c.
Oil hardening ..... 24c.
Special carbon ..... 22c.
Extra carbon ..... 18c.
Regular carbon ..... 14c.
Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

HOW TO HANDLE SCRAP *Faster*

Handle the load *ONCE!* KRANE KAR lifts, transports, and positions it. No need to maneuver the vehicle . . . swing the "live" boom from side to side and raise or lower it, by power, with the full load on the magnet. For loading and unloading scrap at freight cars, handling bulky items around the yards, working at the scrap piles. Safe, fast, flexible, easy to operate. Write for Catalog No. 58.
USERS: Carnegie-Illinois; Bethlehem; Consolidated; Republic; General Motors; American Smelting & Refining; Lima Locomotive Wks.; etc.

*THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER*

2½, 5, AND 10 TON CAPACITIES

KRANE KAR

SILENT HOIST & CRANE CO., 851 63RD ST., BROOKLYN 20, N.Y.

"HERCULES" RED-STRAND WIRE ROPE

You Can Depend On "Hercules" (Red Strand) Wire Rope

**Highlights of Quality**

1. Acid Open-Hearth Steel Wire
2. Rigid Tests and Inspections
3. Correct Manufacturing Methods
4. Furnished in both the Round and Flattened Strand constructions, in either Standard or Preformed Type.

*• • Results are what count, and the performance record of this wire rope continues to make and hold friends.*

There is no guess work when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. If you will tell us how you use wire rope, we shall be glad to suggest the construction and type most suitable for your conditions.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street
SAN FRANCISCO • • 520 Fourth Street
PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

# Fast Tough

*Heavy feed at high speed!*

Heavy feed at high speed spells doom to the ordinary hack saw blade; down-time for your machine, extra expense in money, man hours, and production. The MARVEL Hack Saw Blade, because it is positively *unbreakable* under these conditions, should be "a must" tool in every efficiently operated shop. A tough alloy steel back is electrically welded to high speed steel teeth, producing a blade that can be pulled to almost unlimited tension; can withstand extra heavy feeds and the heat and abrasion of high speed heavy duty sawing.

The same exclusive *unbreakable* feature of MARVEL Hack Saw Blades is also a feature of MARVEL Hole Saws, giving these saws the ability to stand up under abuse. MARVEL Hole Saws cut holes from 5/8" to 4½" diameter in stock up to 1⅛" thick. Usable in portable drill, drill press, or lathe tail stock.

**Complete Range of Metal Sawing Machines**

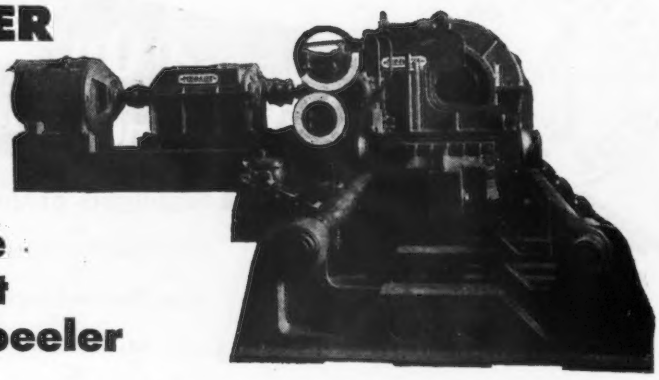
Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price, and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course)

**ARMSTRONG-BLUM MFG. CO.**

**5700 W. Bloomingdale Ave., Chicago 39, Illinois, U.S.A.**



# HYDRAULIC POWER



## for the largest billet peeler

This Medart rotary cutter billet peeler will turn the outside of rolled or forged bars up to 13 inches diameter, and is the largest machine of its type in the world.

Two hydraulic grip carriages on input and output sides clamp the billet. The carriage is moved forward by a large hydraulic cylinder.

Hannifin precision hydraulic cylinders are used by Medart for both these applications. The carriage cylinders are 11 inch bore x 144 inch stroke, an example of Hannifin ability to build large, long stroke cylinders to precision standards. All Hannifin hydraulic cylinders, large or small, are bored and honed to produce a mirror-finish cylinder body—for maximum power, smooth action, and long life.

Write for Bulletin 35 describing Hannifin hydraulic cylinders, Hannifin Manufacturing Company, 621-631 South Kolmar Avenue, Chicago 24, Illinois.

Hannifin

**HYDRAULIC CYLINDERS**


## PRICES

### WELDED PIPE AND TUBING

*Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills*

*(F.o.b. Pittsburgh only on wrought pipe) Base Price—$200.00 per Net Ton*

| | Black | Galv. |
|---|---|---|
| ***Steel (Butt Weld)*** | | |
| ½ in. | 63½ | 51 |
| ¾ in. | 66½ | 55 |
| 1 to 3 in. | 68½ | 57½ |
| ***Wrought Iron (Butt Weld)*** | | |
| ½ in. | 24 | 3½ |
| ¾ in. | 30 | 10 |
| 1 and 1¼ in. | 34 | 16 |
| 1½ in. | 38 | 18½ |
| 2 in | 37½ | 18 |
| ***Steel (Lap Weld)*** | | |
| 2 in. | 61 | 49½ |
| 2½ in and 3 in. | 64 | 52½ |
| 3½ to 6 in. | 66 | 54½ |
| ***Wrought Iron (Lap Weld)*** | | |
| 2 in. | 30½ | 12 |
| 2½ to 3½ in. | 31½ | 14½ |
| 4 in. | 33½ | 18 |
| 4½ to 8 in. | 32½ | 17 |
| ***Steel (Butt, extra strong, plain ends)*** | | |
| ½ in. | 61½ | 50½ |
| ¾ in. | 65½ | 54½ |
| 1 to 3 in. | 67 | 57 |
| ***Wrought Iron (Same as Above)*** | | |
| ½ in. | 25 | 6 |
| ¾ in. | 31 | 12 |
| 1 to 3 in. | 38 | 19½ |
| ***Steel (Lap, extra strong, plain ends)*** | | |
| 2 in. | 59 | 48½ |
| 2½ and 3 in. | 63 | 52½ |
| 3½ to 6 in. | 66½ | 56 |
| ***Wrought Iron (Same as Above)*** | | |
| 2 in. | 33½ | 15½ |
| 2½ to 4 in. | 39 | 22½ |
| 4½ to 6 in. | 37½ | 21 |

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

### CAST IRON WATER PIPE

| | *Per Net Ton* |
|---|---|
| 6-in. and larger, del'd Chicago | $54.80 |
| 6-in. and larger, del'd New York | 52.20 |
| 6-in. and larger, Birmingham | 46.00 |
| 6-in. and larger f.o.b. cars, San Francisco or Los Angeles | 69.40 |
| 6-in. and larger f.o.b. cars, Seattle | 71.20 |

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

### BOILER TUBES

*Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.*

| | *Seamless Cold Drawn* | *Hot Rolled* | *Lap Weld, Hot Rolled* |
|---|---|---|---|
| 2 in. o.d. 13 B.W.G. | 15.03 | 13.04 | 12.38 |
| 2½ in. o.d. 12 B.W.G. | 20.21 | 17.54 | 16.58 |
| 3 in. o.d. 12 B.W.G. | 22.48 | 19.50 | 18.35 |
| 3½ in. o.d. 11 B.W.G. | 28.37 | 24.62 | 23.15 |
| 4 in. o.d. 10 B.W.G. | 35.20 | 30.54 | 28.66 |

*(Extras for less carload quantities)*

| | |
|---|---|
| 40,000 lb. or ft., and over | Base |
| 30,000 lb. or ft. to 39,999 lb. or ft. | 5% |
| 20,000 lb. or ft. to 29,999 lb. or ft. | 10% |
| 10,000 lb. or ft. to 19,999 lb. or ft. | 20% |
| 5,000 lb. or ft. to 9,999 lb. or ft. | 30% |
| 2,000 lb. or ft. to 4,999 lb. or ft. | 45% |
| Under 2,000 lb. or ft. | 65% |

## PRICES

### WIRE PRODUCTS

*To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth*

| | Basing Points Named | Pacific Coast Basing Points† |
|---|---|---|
| | *Base per Keg* | |
| Standard wire nails | $2.55‡ | $3.05‡ |
| Coated nails | 2.55‡ | 3.05‡ |
| Cut nails, carloads | 3.85 | .... |
| | *Base per 100 lb.* | |
| Annealed fence wire | $3.05 | $3.55 |
| Annealed galv. fence wire | 3.40 | 3.90 |
| | *Base Column* | |
| Woven wire fence* | .67 | .35 |
| Fence posts, carloads | .69 | .86 |
| Single loop bale ties | .59 | .84 |
| Galvanized barbed wire** | .70 | .80 |
| Twisted barbless wire | .70 | .... |

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

**‡Add 25c. per 100 lb. to delivered price—OPA interim increase, Jan. 11, 1945.**

### BOLTS, NUTS, RIVETS, SET SCREWS

***Bolts and Nuts***

*(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)*

**Machine and Carriage Bolts:**

*Base discount less case lots*

| | Per Cent Off List |
|---|---|
| ½ in. & smaller x 6 in. & shorter | 65½ |
| 9/16 & ⅝ in. x 6 in. & shorter | 63½ |
| ¾ to 1 in. x 6 in. shorter | 61 |
| 1⅛ in. and larger, all lengths | 59 |
| All diameters over 6 in. long | 59 |
| Lag, all sizes | 62 |
| Plow bolts | 65 |

**Nuts, Cold Punched or Hot Pressed:**

*(Hexagon or Square)*

| | |
|---|---|
| ½ in. and smaller | 62 |
| 9/16 to 1 in. inclusive | 59 |
| 1⅛ to 1½ in. inclusive | 57 |
| 1⅝ in. and larger | 56 |

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

| Semi-Fin. Hexagon Nuts | U.S.S. | S.A.E. |
|---|---|---|
| *Base discount less keg lots* | | |
| 7/16 in. and smaller | .. | 64 |
| ½ in. and smaller | 62 | .. |
| ½ in. through 1 in. | .. | 60 |
| 9/16 in. through 1 in. | 59 | .. |
| 1⅛ in. through 1½ in. | 57 | 58 |
| 1⅝ in. and larger | 56 | .. |

In full keg lots, 10 per cent additional discount.

| ***Stove Bolts*** | *Consumer* |
|---|---|
| Packages, nuts loose | 71 and 10 |
| In packages, with nuts attached | 71 |
| In bulk | 80 |

On stove bolts freight allowed up to 35c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

***Large Rivets***

*(½ in. and larger)*

| | *Base per 100 Lb.* |
|---|---|
| F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham | $3.75 |

***Small Rivets***

*(7/16 in. and smaller)*

| | *Per Cent Off List* |
|---|---|
| F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham | 65 and 5 |

| ***Cap and Set Screws*** | *Consumer Per Cent Off List* |
|---|---|
| Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in. | 64 |
| Upset set screws, cup and oval points | 71 |
| Milled studs | 46 |
| Flat head cap screws, listed sizes | 36 |
| Fillister head cap, listed sizes | 51 |

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

### ROOFING TERNE PLATE

*(F.o.b. Pittsburgh, 112 Sheets)*

| | 20x14 in. | 20x28 in. |
|---|---|---|
| 8-lb. coating I.C. | $6.00 | $12.00 |
| 15-lb. coating I.C. | 7.00 | 14.00 |
| 30-lb. coating I.C. | 7.50 | 15.00 |


A.I.S.I. HY-TEN S.A.E. N.E.

ALLOY STEELS FOR VICTORY

Scientifically selected to conserve critical alloys and meet the requirements of the AIRCRAFT, ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

WHEELOCK, LOVEJOY & CO., INC.

126 Sidney Street Cambridge 39, Mass.

Cleveland 14, Chicago 23, Newark 5, Detroit 3, Buffalo 10, Cincinnati 32



C-F POSITIONERS

Save 72 Lifts

The Nordberg Manufacturing Co., Milwaukee, have eliminated 72 lifts per unit by using a C-F Positioner on the production job illustrated. These complex weldments (Scavenging air headers for large Diesel engines) have to be "procedure-welded" and formerly required 72 crane lifts which took an average of 20 minutes apiece.

Now, the C-F Positioner moves the weldment through the routine positions under a push button control saving 24 hours crane time, 24 hours crane operator's time, and the same of both a sling man and the welder's time per weldment . . . in other words saving three man-days and one crane-day on each header produced.

C-F Positioners come in 6 sizes—capacities to 30,000 lb. All are pedestal mounted, rotate 360° and tilt to 135° beyond horizontal.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO., 1303 S. Kilbourn Ave., Chicago 23, U.S.A.

## PIG IRON

**All prices set in bold face type are maximum established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maximum. Delivered prices do not reflect 3 per cent tax on freight rates.**

| | No. 2 Foundry | Basic | Bessemer | Malleable | Low Phosphorus | Charcoal |
|---|---|---|---|---|---|---|
| Boston | *$25.50* | *$25.00* | *$26.50* | *$26.00* | ..... | ..... |
| Brooklyn | *27.50* | *27.00* | ..... | *28.00* | ..... | ..... |
| Jersey City | *26.53* | *26.03* | *27.53* | *27.03* | ..... | ..... |
| Philadelphia (4) | *25.84* | *25.34* | *26.84* | *26.34* | *$30.74* | ..... |
| Bethlehem | $25.00 | $24.50 | $26.00 | $25.50 | ..... | ..... |
| Everett, Mass. | 25.00 | 24.50 | 26.00 | 25.50 | ..... | ..... |
| Swedeland, Pa. | 25.00 | 24.50 | 26.00 | 25.50 | ..... | ..... |
| Steelton, Pa. | ..... | 24.50 | ..... | ..... | $29.50 | ..... |
| Birdsboro, Pa. (3) | 25.00 | 24.50 | 26.00 | 25.50 | 29.50 | ..... |
| Sparrows Point, Md. | 25.00 | 24.50 | ..... | ..... | ..... | ..... |
| Erie, Pa. | 24.00 | 23.50 | 25.00 | 24.50 | ..... | ..... |
| Neville Island, Pa. | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Sharpesville, Pa. (1) | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Buffalo | 24.00 | 23.00 | 25.00 | 24.50 | 29.50 | ..... |
| Cincinnati, Ohio | *25.11* | *24.61* | ..... | *25.11* | ..... | ..... |
| Canton, Ohio | *25.39* | *24.89* | *25.89* | *25.39* | *32.69* | ..... |
| Mansfield, Ohio | *25.94* | *25.44* | *26.44* | *25.94* | *32.86* | ..... |
| St. Louis | *24.50* | *24.50* | ..... | ..... | ..... | ..... |
| Chicago | 24.00 | 23.50 | 24.50 | 24.00 | *35.46* | ..... *$37.34* |
| Granite City, Ill. | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Cleveland | 24.00 | 23.50 | 24.50 | 24.00 | *32.42* | ..... |
| Hamilton, Ohio | 24.00 | 23.50 | ..... | 24.00 | ..... | ..... |
| Toledo | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Youngstown | 24.00 | 23.50 | 24.50 | 24.00 | *32.42* | ..... |
| Detroit | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Lake Superior fc. | ..... | ..... | ..... | ..... | ..... | 34.00 |
| Lyles, Tenn., fc. (2) | ..... | ..... | ..... | ..... | ..... | 33.00 |
| St. Paul | *26.63* | 26.13 | *27.10* | *26.63* | *39.80* | ..... |
| Duluth | 24.50 | 24.00 | 25.00 | 24.50 | ..... | ..... |
| Birmingham | 20.38 | 19.00 | 25.00 | ..... | ..... | ..... |
| Los Angeles | *26.95* | ..... | ..... | ..... | ..... | ..... |
| San Francisco | *26.95* | ..... | ..... | ..... | ..... | ..... |
| Seattle | *26.95* | ..... | ..... | ..... | ..... | ..... |
| Provo, Utah | 22.00 | 21.50 | ..... | ..... | ..... | ..... |
| Montreal | *27.50* | *27.50* | ..... | *28.00* | ..... | ..... |
| Toronto | *25.50* | *25.50* | ..... | *26.00* | ..... | ..... |

GRAY FORGE IRON; Valley or Pittsburgh furnace ..... $23.50

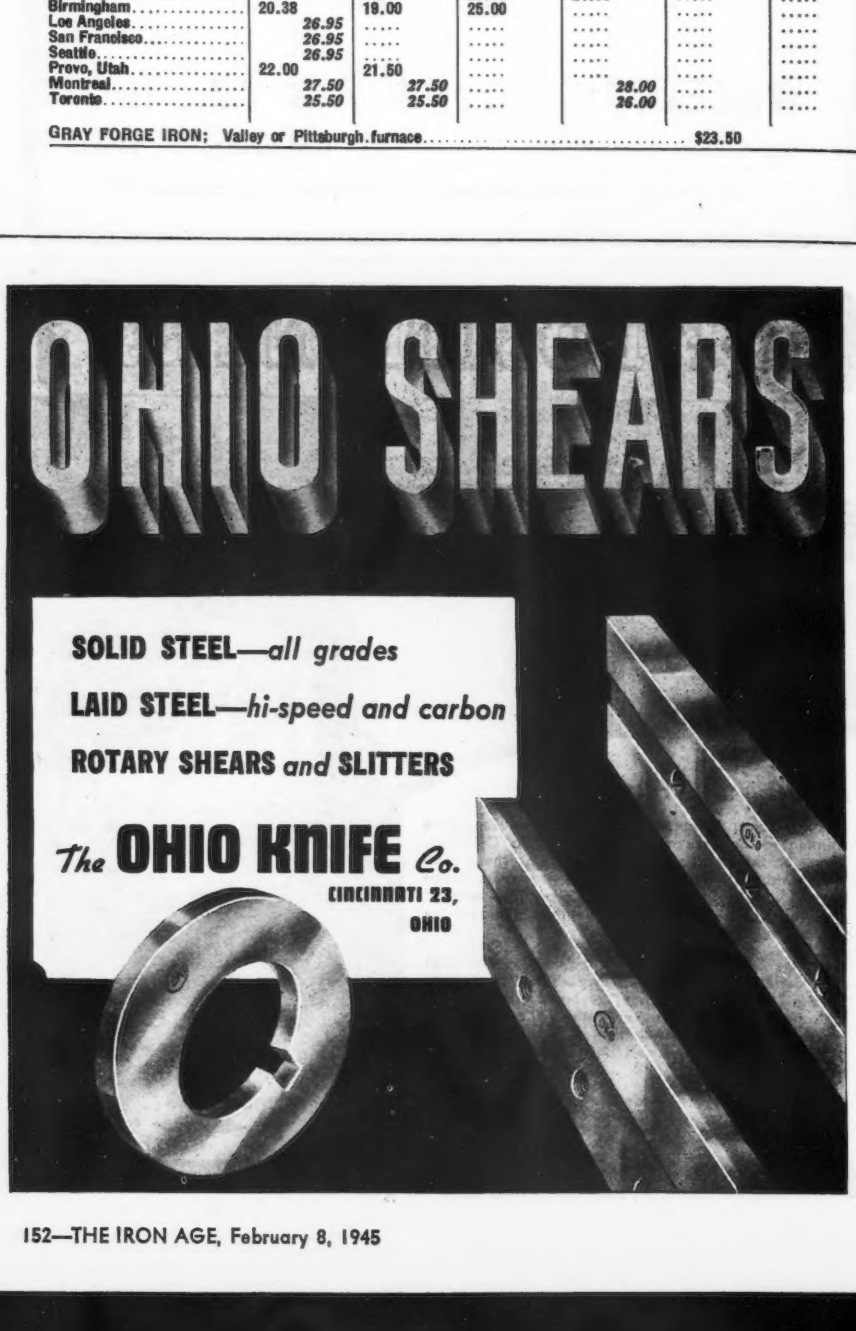
(1) Pittsburgh Coke & Iron Co. (Sharpesville, Pa., furnace only) and the Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron & Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorus iron; high phosphorus sells for $28.50 at the furnace.

(3) E. & G. Brooke Co., Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.




## METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

| | |
|---|---|
| Copper, electrolytic, 150 and 200 mesh | 21½ to 23½c. |
| Copper, reduced, 150 and 200 mesh | 20½ to 25½c. |
| Iron, commercial, 100 and 200 mesh 96 + % Fe | 13½ to 15c. |
| Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots | 4c. |
| Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots | 63c. |
| Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe | 30 to 33c. |
| Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe | 42c. |
| Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe | 90c. |
| Aluminum, 100 and 200 mesh | *23 to 27c. |
| Antimony, 100 mesh | 20.6c. |
| Cadmium, 100 mesh | $1 |
| Chromium, 150 mesh | $1.03 |
| Lead, 100, 200 & 300 mesh | 11½ to 12½c. |
| Manganese, 150 mesh | 51c. |
| Nickel, 150 mesh | 51½c. |
| Solder powder, 100 mesh | 8½c. plus metal |
| Tin, 100 mesh | 58¾c. |
| Tungsten metal powder, 98%-99%, any quantity, per lb. | $2.60 |
| Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb. | $2.60 |
| Under 100 lb. | $3.00 |

*Freight allowed east of Mississippi.

## COKE

| Furnace, beehive (f.o.b. oven) | Net Ton |
|---|---|
| Connellsville, Pa. | $7.00* |
| **Foundry, beehive (f.o.b. oven)** | |
| Fayette Co., W. Va. | 8.10 |
| Connellsville, Pa. | 8.25 |
| **Foundry, By-Product** | |
| Chicago, del'd | 13.35 |
| Chicago, f.o.b. | 12.60 |
| New England, del'd | 14.25 |
| Kearny, N. J., f.o.b. | 12.65 |
| Philadelphia, del'd | 12.88 |
| Buffalo, del'd | 13.00 |
| Portsmouth, Ohio, f.o.b. | 11.10 |
| Painesville, Ohio, f.o.b. | 11.75 |
| Erie, del'd | 12.75 |
| Cleveland, del'd | 12.80 |
| Cincinnati, del'd | 12.85 |
| St. Louis, del'd | 13.85 |
| Birmingham, del'd | 10.59 |

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges.

## PRICES

### REFRACTORIES
*(F.o.b. Works)*

***Fire Clay Brick***

| | *Per 1000* |
|---|---|
| Super-duty brick, St. Louis | $64.60 |
| First quality, Pa., Md., Ky., Mo., Ill. | 51.30 |
| First quality, New Jersey | 56.00 |
| Sec. quality, Pa., Md., Ky., Mo., Ill. | 46.55 |
| Sec. quality, New Jersey | 51.00 |
| No. 1 Ohio | 43.00 |
| Ground fire clay, net ton | 7.60 |

***Silica Brick***

| | |
|---|---|
| Pennsylvania and Birmingham | $51.30 |
| Chicago District | 58.90 |
| Silica cement, net ton (Eastern) | 9.00 |

***Chrome Brick***

| | *Per Net Ton* |
|---|---|
| Standard chemically bonded, Balt., Plymouth Meeting, Chester | $54.00 |

***Magnesite Brick***

| | |
|---|---|
| Standard, Balt. and Chester | $76.00 |
| Chemically bonded, Baltimore | 65.00 |

***Grain Magnesite***

| | |
|---|---|
| Domestic, f.o.b. Balt. and Chester in sacks (carloads) | $43.48 |
| Domestic, f.o.b. Chewelah, Wash. (in bulk) | 22.00 |

### RAILS, TRACK SUPPLIES
*(F.o.b. Mill)*

| | |
|---|---|
| Standard rails, heavier than 60 lb., No. 1 O.H., gross ton | *$40.00 |
| Angle splice bars, 100 lb. | 2.70 |
| *(F.o.b. Basing Points)* | *Per Gross Ton* |
| Light rails (from billets) | *$40.00 |
| Light rails (from rail steel) | 39.00 |
| | *Base per Lb.* |
| Cut spikes | 3.00c. |
| Screw spikes | 5.15c. |
| Tie plate, steel | 2.15c. |
| Tie plates, Pacific Coast | 2.30c. |
| Track bolts | 4.75c. |
| Track bolts, heat treated, to railroads | 5.00c. |
| Track bolts, jobbers discount | 63-5 |

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

***Add $3.00 per gross ton to delivered price —OPA interim increase, Jan. 11, 1945.**

### CORROSION AND HEAT-RESISTING STEEL
*(Per lb. base price, f.o.b. Pittsburgh)*

***Chromium-Nickel Alloys***

| | No. 304 | No. 302 |
|---|---|---|
| Forging billets | 21.25c. | 20.40c. |
| Bars | 25.00c. | 24.00c. |
| Plates | 29.00c. | 27.00c. |
| Structural shapes | 25.00c. | 24.00c. |
| Sheets | 36.00c. | 34.00c. |
| Hot rolled strip | 23.50c. | 21.50c. |
| Cold rolled strip | 30.00c. | 28.00c. |
| Drawn wire | 25.00c. | 24.00c. |

***Straight-Chromium Alloys***

| | No. 410 | No. 430 | No. 442 | No. 446 |
|---|---|---|---|---|
| F.Billets | 15.725c. | 16.15c. | 19.125c. | 23.375c. |
| Bars | 18.50c. | 19.00c. | 22.50c. | 27.50c. |
| Plates | 21.50c. | 22.00c. | 25.50c. | 30.50c. |
| Sheets | 26.50c. | 29.00c. | 32.50c. | 36.50c. |
| Hot strip | 17.00c. | 17.50c. | 24.00c. | 35.00c. |
| Cold strip | 22.00c. | 22.50c. | 32.00c. | 52.00c. |

***Chromium-Nickel Clad Steel (20%)***

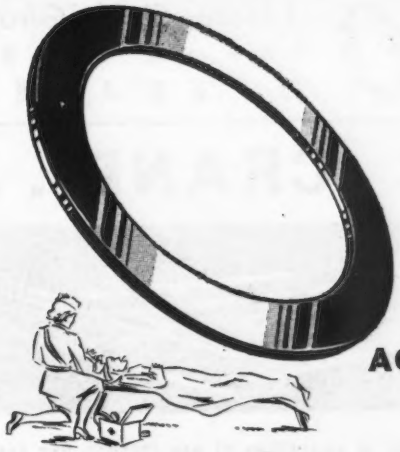
| | No. 304 |
|---|---|
| Plates | 18.00c.* |
| Sheets | 19.00c. |

*Includes annealing and pickling.

### ELECTRICAL SHEETS
*(Base, f.o.b. Pittsburgh)*

| | *Per Lb.* |
|---|---|
| Field grade | 3.20c. |
| Armature | 3.55c. |
| Electrical | 4.05c. |
| Motor | 4.95c. |
| Dynamo | 5.65c. |
| Transformer 72 | 6.15c. |
| Transformer 65 | 7.15c. |
| Transformer 58 | 7.65c. |
| Transformer 52 | 8.45c. |

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

*This* **KING** *Flange*

**ACTUALLY SAVES LIVES**

In most cases it is difficult to trace directly the use to which a King Ring or Flange is put. That each is used to speed victory, directly or indirectly, we know. That is constant incentive to keep turning out standard shapes and sizes, special shapes and sizes from 288 varieties of bar stock.

In this particular case, however, we know the King Flange becomes a tight-fitting gasket for equipment which produces penicillin. It's the horse-shoe nail story all over again and King is proud to have a part—no matter how small—in saving lives.

**KING FIFTH WHEEL COMPANY**

**2917 N. SECOND STREET, PHILADELPHIA 33, PA.**

HEAT-TREATED STEEL SHOT

**We manufacture shot and grit for endurance**

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

**Heat-Treated Steel Shot and Heat-Treated Steel Grit**

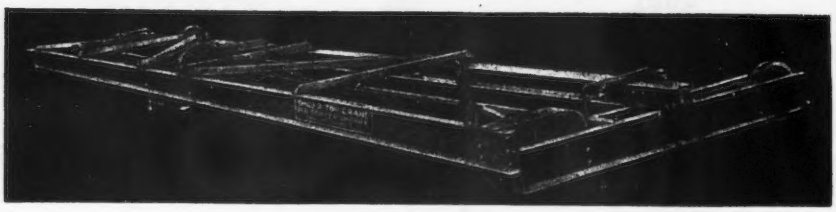
has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

**HARRISON ABRASIVE CORPORATION**

**Manchester, New Hampshire**

HEAT-TREATED STEEL GRIT

# CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED ELECTRIC CRANE . . .



● Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.

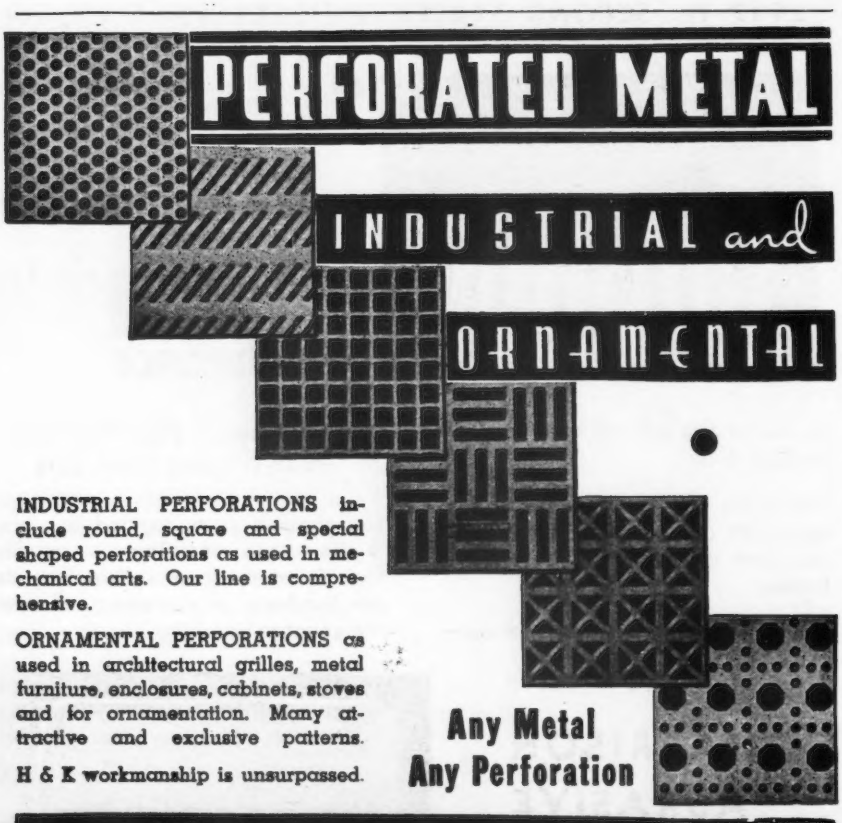
Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

**CONCO ENGINEERING WORKS**

Div. of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.

Builders Of Conco Torpedo Electric Hoist

# PERFORATED METAL




INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furniture, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns.

H & K workmanship is unsurpassed.

Any Metal
Any Perforation

**The Harrington & King PERFORATING Co.**

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## PRICES

### *Ferromanganese*

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

| | |
|---|---|
| Carload lots (bulk) | $135.00 |
| Carload lots (packed) | 141.00 |
| Less ton lots (packed) | 148.50 |

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

### *Manganese Metal*

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

| | |
|---|---|
| Carload, bulk | 36c. |
| L.c.l. lots | 38c. |

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

| | |
|---|---|
| Carload, bulk | 34c. |
| L.c.l. lots | 35c. |

### *Spiegeleisen*

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

| | 16-19% Mn 3% max. Si | 19-21% Mn 3% max. Si |
|---|---|---|
| Carloads | $35.00 | $36.00 |
| Less ton | 47.50 | 48.50 |

### *Electric Ferrosilicon*

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 50% Si | 6.65c. | 7.10c. | 7.25c. |
| 75% Si | 8.05c. | 8.20c. | 8.75c. |
| 80-90% Si. | 8.90c. | 9.05c. | 9.55c. |
| 90-95% Si. | 11.05c. | 11.20c. | 11.65c. |

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

### *Silvery Iron*

*(C/L, Per Gross Ton, base 6.00 to 6.50 Si)*

| | |
|---|---|
| F.o.b. Jackson, Ohio | $29.50* |
| Buffalo | 30.75* |

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*OPA price established 6-24-41.

### *Bessemer Ferrosilicon*

Prices are $1 a ton above silvery iron quotations of comparable analysis.

### *Silicon Metal*

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 96% Si, 2% Fe. | 13.10c. | 13.55c. | 16.50c. |
| 97% Si, 1% Fe. | 13.45c. | 13.90c. | 16.80c. |

### *Ferrosilicon Briquets*

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Carload, bulk. | 3.35c. | 3.50c. | 3.65c. |
| 2000 lb.-carload | 3.8c. | 4.2c | 4.25c. |

### *Silicomanganese*

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

| | |
|---|---|
| Carload, bulk | 6.05c. |
| 2000 lb. to carload | 6.70c. |
| Under 2000 lb. | 6.90c. |
| Briquets, contract, basis carlots, bulk freight allowed, per lb. | 5.30c. |
| 2000 lb. to carload | 6.30c. |
| Less ton lots | 6.55c. |

### *Ferrochrome*

*(65-72% Cr, 2% max. Si)*

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 0.06% C | 23.00c. | 23.40c. | 24.00c. |
| 0.10% C | 22.50c. | 22.90c. | 23.50c. |
| 0.15% C | 22.00c. | 22.40c. | 23.00c. |
| 0.20% C | 21.50c. | 21.90c. | 22.50c. |
| 0.50% C | 21.00c. | 21.40c. | 22.00c. |
| 1.00% C | 20.50c. | 20.90c. | 21.50c. |
| 2.00% C | 19.50c. | 19.90c. | 21.00c. |
| 66-71% Cr, 4-10% C | 13.00c. | 13.40c. | 14.00c. |
| 62-66% Cr, 5-7% C | 13.50c. | 13.90c. | 14.50c. |

### *High-Nitrogen Ferrochrome*

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

### *Low-Carbon Ferromanganese*

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

| | Carloads, Bulk | Ton Lots | Less Ton |
|---|---|---|---|
| 0.10% max. C, 1 or 2% max. Si | 23.00c. | 23.40c. | 23.65c. |
| 0.15% max. C, 1 or 2% max. Si | 22.00c. | 22.40c. | 22.65c. |
| 0.30% max. C, 1 or 2% max. Si | 21.00c. | 21.40c. | 21.65c. |
| 0.50% max. C, 1 or 2% max. Si | 20.00c. | 20.40c. | 20.65c. |
| 0.75% max. C, 7.00% max. Si | 16.00c. | 16.40c. | 16.65c. |

### *Ferrochrome Briquets*

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Carload, bulk.. | 8.25c. | 8.55c. | 8.95c. |
| Ton lots ..... | 8.75c. | 9.25c. | 10.75c. |
| Less ton lots... | 9.00c. | 9.50c. | 11.00c. |

### *Ferromanganese Briquets*

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Carload, bulk .. | 6.05c. | 6.30c. | 6.50c. |
| Carload, bulk .. | 6.05c. | 6.30c. | 6.60c. |
| Ton lots ..... | 6.65c. | 7.55c. | 8.55c. |
| Less ton lots .. | 6.80c. | 7.80c. | 8.80c. |

### *Calcium—Manganese—Silicon*

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Carloads ..... | 15.50c. | 16.00c. | 18.05c. |
| Ton lots ..... | 16.50c. | 17.35c. | 19.10c. |
| Less ton lots.. | 17.00c. | 17.85c. | 19.60c. |

### *Calcium Metal*

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

| | Cast | Turnings | Distilled |
|---|---|---|---|
| Ton lots ..... | $1.80 | $2.30 | $5.00 |
| Less ton lots.. | 2.30 | 2.80 | 5.75 |

### *Chromium—Copper*

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot ..... 45c.

### *Ferroboron*

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Ton lots ..... | $1.20 | $1.2075 | $1.229 |
| Less ton lots .... | 1.30 | 1.3075 | 1.329 |

### *Manganese—Boron*

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Ton lots ... | $1.89 | $1.903 | $1.935 |
| Less ton lots | 2.01 | 2.023 | 2.055 |

### *Nickel—Boron*

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 11,200 lb. or more .. | $1.90 | $1.9125 | $1.9445 |
| Ton lots ... | 2.00 | 2.09125 | 2.0445 |
| Less ton lots | 2.10 | 2.1125 | 2.1445 |

### *Other Ferroalloys*

| | |
|---|---|
| Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more.... | $1.90 |
| Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va. | |
| Open hearth ..... | $2.70 |
| Crucible ..... | $2.80 |
| Primos ..... | $2.90 |
| Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... | $1.50 |
| Vanadium pentoxide, 88%-92% $V_2O_5$ technical grade, contract basis, any quantity, per lb. contained $V_2O_5$. Spot sales add 5c. per lb. contained $V_2O_5$ ..... | $1.10 |
| Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval) | |
| Carload lots ..... | 25c. |
| 2000 lb. to carload..... | 26c. |
| Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval) | |
| Carload lots ..... | 58c. |
| 2000 lb. to carload..... | 59c. |
| Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis | |
| No. 1 ..... | 87.5c. |
| No. 6 ..... | 60c. |
| No. 79 ..... | 45c. |
| Bortram, f.o.b. Niagara Falls | |
| Ton lots, per lb..... | 45c. |
| Less ton lots, per lb..... | 50c. |
| Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb. | |
| 2000 lb. lots..... | $2.25 |
| Under 2000 lb. lots..... | $2.30 |
| Ferrotitanium, 40%-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. | $1.23 |
| Less ton lots ..... | $1.25 |
| Ferrotitanium, 20%-25%, 0.10%C. max., ton lots, per lb. contained titanium ..... | $1.35 |
| Less ton lots ..... | $1.40 |
| High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload.... | $142.50 |
| Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton..... | $58.50 |
| Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Sigio), Tenn., $3 unitage freight equalized with Nashville, per gross ton ..... | $75.00 |
| Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. | 95c. |
| Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. ..... | 80c. |
| Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo..... | 80c. |
| Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo..... | 80c. |
| Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales | |
| Carload lots ..... | 14c. |
| Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy | |
| Carload, bulk ..... | 4.6c. |
| Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... | 5.75c. |
| Ton lots ..... | 7.25c. |
| Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb. | |
| Car lots ..... | 8.00c. |
| Ton lots ..... | 8.75c. |
| Less ton lots ..... | 9.25c. |

*Flawless*

**PRECISION**

The flawless precision of Admiral Chester Nimitz and General Douglas MacArthur is squeezing Mr. Tojo and Tokio behind the eight ball.

From Tulagi to the Marshalls, the Marianas to Saipan and the Philippines, the very preciseness of these, our great leaders, inspires millions of Americans to expand their productive capacities.

Cognizant of the unusual ability of our strong leaders and the high spirit of our enlisted personnel who fight so bravely, we at Universal have taken an extra "hitch" in our belt and up, up, go our production records.

Thus we express our gratitude for the privilege of serving in so great a cause.

**UNIVERSAL**

**PRECISION BALLS**

**OF STEEL, BRONZE AND SPECIAL MATERIALS**

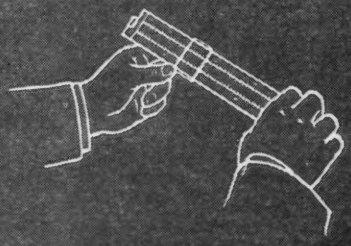
*PRODUCTS OF*

**VULCANITE PORTLAND CEMENT CO.**

**WILLOW GROVE, Montgomery County, Pa.**

*Established 1894* Telephone: Willow Grove 1200

# SPRINGS WITH *Engineered* PEP and POWER!



THERE'S many a mechanism today doing a *better* job—*longer*—because of specialized engineering principles applied to the springs. Automatic mechanical action calls for springs with the PEP to produce continued repetitive action, and the POWER to perform the desired function. Only sound engineering can provide *both* for individual performance requirements.

We have seen this in mechanical developments of the past. The unparalleled demands of this war have demonstrated it to a remarkable degree. Improvements and new devices to come will benefit from just such knowledge.

From now on, make sure you get the best mechanical action by using Barnes-made springs with *Engineered Pep and Power.*

**WALLACE BARNES COMPANY** DIVISION OF ASSOCIATED SPRING CORPORATION
BRISTOL, CONNECTICUT, U. S. A.